



## Operation & Maintenance Manual

Front Loading Direct Steam  
Heated Rectangular Section  
Priorclave





## Introduction

Priorclave autoclaves are a range of general-purpose laboratory autoclaves intended primarily for media preparation, the making safe of ordinary laboratory and pathological waste and other apparatus sterilisation purposes. The autoclaves are manufactured to a high standard and feature a number of patented innovative design features. The sophisticated **TACTROL** microprocessor control system provides a very simple method of setting even the most complex cycles. The machines have been designed from the outset for easy and safe operation and maintenance.

Properly looked after your autoclave should give years of valuable and trouble free service.

### Priorclave Service

**Serial Number:** .....

**Date of Manufacture:** .....

**Software Version:**       **V** .....

Please quote the above when asking for parts or service:

### PRIORCLAVE LIMITED

129 /131 Nathan Way  
West Thamesmead Business Park  
London  
SE28 0AB

**Telephone:**   +44 (0)208-316-6620

**Fax:**           +44 (0)208-855-0616

**E-mail:**       sales@priorclave.co.uk

**Website:**     www.priorclave.co.uk

or your local agent:

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## Symbols used in this manual and their meanings



### **WARNING: Mechanical Hazard**

In this manual, warnings draw attention to the potential for Danger to personnel up to and including risk of severe injury or death. Each Mechanical Hazard Warning is emphasised by the icon to the left.



### **WARNING: Electrical Hazard**

In this manual, warnings draw attention to the potential for Danger to personnel up to and including risk of severe injury or death. Each Electrical Hazard Warning is emphasised by the icon to the left.



### **WARNING: Bio-hazard**

In this manual, warnings draw attention to the potential for Danger to personnel up to and including risk of severe injury or death. Each Bio-hazard Warning is emphasised by the icon to the left.



### **Caution: -Please Note**

In this manual, cautions draw attention to the potential for Damage to equipment. Each caution warning is emphasized by the icon to the left.

## Important Notices



Priorclave Pressure Vessels and Autoclaves are manufactured according to BS2646 Part 1 (1993). It is recommended that the user/operator ensures that the autoclave is installed, operated, maintained and tested according to parts 2,3,4 & 5 of this standard for safe and effective use and that an adequate logging record of operation and maintenance be established.



Before despatch from our works all Priorclaves are subjected to rigorous electrical safety tests to the appropriate standards. Should you or your contractors carry out further insulation and flash tests as part of your internal procedures please disconnect the switch mode power supply before testing. Failure to do so will result in a test failure and may lead to corruption of the microprocessor memory which cannot be covered by our warranty.

### Safety



If you are unclear about any aspects of this manual, the use and operation of the autoclave or your autoclave process please contact Priorclave or your authorised Priorclave dealer before proceeding.



**Always wear gloves a facemask and adequate protective clothing when unloading an autoclave and ensure that the workload does not exceed safe limits.**

Priorclave are pleased provide training for operators in the use of their autoclaves at a small extra charge.

### Thermal Lock



The safety Thermal Lock (80°C door retention device) has been set in accordance with the load and procedure defined in paras. 3.3.3.2.3 and 3.3.3.3 of BS2646 Part 5:1993.

The relatively light load defined under this procedure may not be appropriate to the load to be autoclaved in your Priorclave. Therefore, to ensure compliance with Health & Safety Executive Guidance Note PM73 'Safety at Autoclaves' and to avoid possible injury you are strongly advised to have your autoclave with its normal working load formally validated, and the thermal lock set up accordingly by properly trained personnel.

### Stainless Steel Pressure Vessels.



Vessels are manufactured from grade 316 stabilised stainless steel, designed built and tested in accordance with BS5500 category 3 as required by BS2646 Part 1. Grade 316 stainless steel is employed to reduce the corrosive effects of substances such as hydroxides and

chlorine. However we recommend that the interior of the vessel is kept free of such potentially harmful substances and is regularly cleaned out with soft water. The use of chlorine based or other aggressive cleaners is not recommended. Exposure to such chemicals could damage the surface finish and the integrity of the pressure vessel and door. Care should also be taken not to routinely introduce such chemicals where they are used to pre-wash items that form part of the load. In such cases the items should be thoroughly rinsed before autoclaving.

### **Product Life**

Due to fatigue occurring in normal use the life of all pressure vessels is finite regardless of corrosion, erosion or other damage. Using a calculation from BS3970, and assuming an average autoclaving cycle time of 2.5 hours this gives the autoclave vessel a projected fatigue life of 10,000 operating cycles. The lifespan of the autoclave will obviously depend upon frequency of use, but for example (based on a 365 day working year) if the autoclave is used two or four times per day this gives a working life of 13.6 to 6.8 years respectively. Your own usage of the autoclave should be considered to determine the actual lifespan of the autoclave.

### **Cleaning**



This equipment contains sensitive electrical equipment. Although designed to withstand laboratory conditions it is not designed for wet cleaning. Cleaning this equipment by hosing down may cause damage, invalidating the warranty, and may cause an electrocution hazard.

External cleaning should be carried out with a damp cloth or with proprietary, non-abrasive cleaners.

### **Servicing and Maintenance of Priorclave Autoclaves**



Priorclave Laboratory Autoclaves are complex pressure systems designed and built to special regulations and as such should only be serviced or maintained by properly trained personnel. Priorclave Ltd. cannot be held responsible for hazards or damage resulting from work carried out on the pressure system by untrained or unauthorised personnel. If in doubt please contact Priorclave Service or your nearest authorised dealership.

### **CE Marking**

The CE mark applied to this autoclave is applied in relation to the EMC (Electromagnetic Compatibility) directive and the Low Voltage directive of the European Community. This indicates that this Priorclave autoclave meets the following technical standards:

- **BSEN61000-6-3:2001**  
Electromagnetic Compatibility. Generic Emission Standard. Residential, Commercial & Light Industry.
- **BSEN61000-6-1:2001**  
Electromagnetic Compatibility. Generic Immunity Standard. Residential, Commercial & Light Industry.
- **BSEN61010-1:2001**  
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory use.
- **BSEN61010-2-040:2005**  
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory use; Part 2-041, Particular Requirements for Autoclaves using Steam for the treatment of Medical Materials and for Laboratory Processes.

### **Pressure vessels**

- **PD5500 2009**  
Unfired fusion welded pressure vessels
- **BS2646 1996**  
Autoclaves for sterilisation in laboratories
- **BS3970 1990**

## Sterilising and disinfecting equipment for medical products

Conformity assessment modules B1 + D of the European Pressure equipment directive have been applied to ensure compliance with the essential safety requirements.

A "Declaration of Conformity" in accordance with the above standards has been made and is on file at:

**Priorclave Ltd.**  
**129 /131 Nathan Way**  
**West Thamesmead Business Park**  
**London SE28 0AB**

## Environmental Conditions

This equipment has been designed for safe operation within the following environmental conditions:

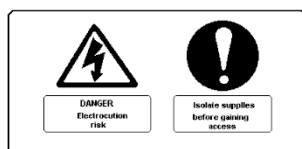
- Indoor Use.
- Altitude up to 2,000 M. (See Appendix B - Steam Table for special conditions affecting calibration for operation at elevated altitudes).
- Temperatures between 5°C and 40°C. **N.B.** The cooling performance of Air Cooled autoclaves, however will be significantly affected at higher temperatures in this range.
- Maximum Relative Humidity of 85% at any temperature between 5°C and 40°C.
- Mains Supply Voltage Variations not exceeding  $\pm 10\%$  of that shown on the Serial Plate.

## Electromagnetic Interference

This equipment has been designed to comply with the requirements for immunity from electromagnetic interference under normal conditions of use. Care should be taken when siting the equipment however, to avoid interference from potential extreme sources of interference such as MR scanners or x-ray equipment.

## Hazard Statement

### Electrical Hazard Stickers



When this sticker has been placed on a removable panel the power must be switched off before the panel is removed. There may be a number of areas behind the labelled panel that constitute an electrical shock hazard. All such panels are service access panels only and should not be removed unless there is a full understanding of the equipment.

### Mechanical Hazard Sticker



When this sticker has been placed on a removable panel the power must be switched off before the panel is removed. There may be a number of areas behind the labelled panel that constitute a mechanical hazard. All such panels are service access panels only and should not be removed unless there is a full understanding of the equipment.

# Declaration of Conformity

**Date of issue:** 30/04/2007      **Revision No:** 6  
**Place of issue:** Manufacturers works      **Reference:** ecdec\RSC – PED assembly



## EC Declaration of conformity

This is a global declaration relating to the entire pressure equipment of the product range identified below:

**Equipment Manufacturer:** Priorclave Ltd  
 129-131 Nathan Way  
 West Thamesmead Business Park  
 London  
 SE28 0AB. UK

## Equipment Description:

Priorclave Laboratory autoclaves – RSC series, with Tactrol microprocessor control system.

## Model Numbers:

PS/RSC/EH230, PS/RSC/EH350, PS/RSC/EH450 and PS/RSC/EH700. For direct steam heated variants substitute S for E. All models may be suffixed DBL to denote double entry versions.

## Conformity Data:

Directive	Relevant standards	Comments	
Low Voltage Directive 72/23/EEC	EN61010-1 2001997 BS EN 61010-2-040:2005		
EMC Directive 89/36/EEC as amended by 93/68/EEC	EN50081-1 EN50082-1  EN61326 1997 (+A1/A2)	Technical construction file ref EMCTCFAU	
		Competent Body:	<b>Inchcape Testing Ltd</b> Manfield Park Cranleigh Surrey
		Testing conducted in 2004 without certification by a competent body	
Pressure Equipment Directive 97/23/EC Conformity assessment Modules B1+D	PD5500 2000 BS2646 1993	Notified Body No 0037 <b>Zurich Risk Services</b> Park House Bristol Road South Rubery Birmingham B45 9AH	Approval references: Vessel (module B1) Certificate numbers SS42059010-3 and SS42059010-4  Assembly certificate number SS42059010-21  Interlock certificate number SS42059010-24  Manufacturing (module D) certificate number SS42059010-26

## Declaration:

Priorclave Ltd declares that the above products conform with the essential requirements of the above directives. Where appropriate this has been demonstrated by the application of the relevant standard(s). The CE mark was first affixed to these products in 1996

Signed for and on behalf of Priorclave Ltd

**Tony Collins**  
 Managing Director



Certificate Number 6973

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## Operating Summary



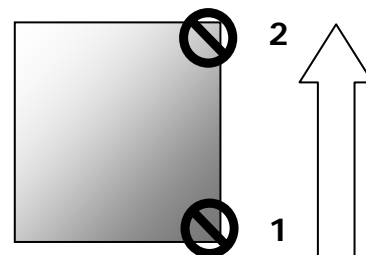
Before proceeding please check the specification sheet at the front of this manual to establish which options and accessories, if any, are fitted to your Priorclave. This will determine whether you will need to read the instructions for these options later in this manual.

Check the electricity and water supplies are **ON** and check that the steam supply (or Internal steam generator if fitted) is **ON and that there is** sufficient pressure (3.5 Bar) to run a cycle.

Check that the emergency stop button is not pressed in and release if necessary.

1. Press the '**door**' button on the control panel there will be a bleep and the message '**HOLD**' will be displayed in the timer display.

2. Wait for a short time until the timer display returns to normal, there is another bleep and the '**door**' indicator illuminates. The '**door**' button can now be pressed again to release the lock. When the lock is released a green indicator lamp below the lower hand wheel will illuminate



3. Open the door by undoing the lower black hand-wheel first followed by the red safety hand-wheel. With the door free, carefully pull open.

4. Load the autoclave directly onto the shelves or with baskets or containers.

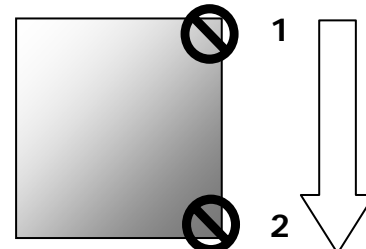
5. Set the temperature as required using the up/down keys.

6. Set the process time as required using the up/down keys.

7. Set / select other functions i.e. free-steam, rapid cooling etc., as required and if fitted.

8. Carefully close the pressure door and fully wind in the safety handwheel.

9. Press and release the '**door**' button to release the door lock. There will be a bleep and the lock will immediately withdraw. The green indicator lamp below the lower handwheel will illuminate whilst the lock is withdrawn. Secure by fully tightening the lower handwheel. If any difficulty is encountered, open the door and check for obstruction.



10. Wait a few seconds for the '**start**' indicator to illuminate, and press the '**start**' button to begin the cycle.

### Cycle Abort and Thermal Lock Override

11. **Aborting a cycle**

To abort the cycle at any stage press the '**start**' Button.

12. **Thermal Lock Override**

First abort the cycle as above. After checking that there is no pressure within the autoclave turn the thermal lock key to the right and hold it there. Then press the '**door**' button once, keeping the thermal lock key held over. Wait during the '**hold**' display until the '**door**' indicator illuminates. Keep the key held and press the 'Door' button to unlock the door. The keyswitch can now be released. If the key is released at any stage the procedure must be repeated to open the door and reset the display.

# Preparing Your Priorclave for Use for the First Time



Unpack the autoclave and check against the delivery note that all items ordered have been delivered.

Any shortages or damage must be reported to Priorclave Limited within 7 days of delivery.

## Positioning

When positioning the autoclave consideration should be given to proper access for servicing and maintenance purposes. Space must also be allowed for pipe work and electrical connections.

### Maintenance access



It is stipulated by British Standard 2646 that autoclaves should have 1 metre clear space all round to allow for service access, but we recognise that this can be difficult to provide. At minimum we would recommend a minimum of 500mm clear space all round. If it is not possible to provide this all round it may be acceptable to provide space to one side only provided the autoclave service connections can be made such that the autoclave (if size permits) can be moved without difficulty. In the case of all pipe connections provision should be made to ensure that rigid pipe work can be readily disconnected.

A space to the rear of the autoclave of up to 300mm can be required to accommodate pipework connections. This will reduce for more simple installations such as autoclaves without vacuum systems. For autoclaves with drain condensers this space should be increased to 500mm. The requirements for most additional items are described later.

### Heat emission

Regardless of insulation arrangements etc employed to reduce the temperature of the autoclave outer casing all autoclaves will emit heat into the work area. For the comfort of staff it is recommended that autoclaves are installed in air conditioned areas. Heat output from the autoclave will vary at different stages of the cycle. For the purpose of calculating loading placed on the air conditioning system by the autoclave it should be adequate to allow for a figure of one third of the total heater power of the autoclave, although the actual output will vary according to the autoclave settings used.



Air cooled autoclaves cool more quickly in a cool room, and therefore high ambient temperatures increase autoclave cycle times. This can become particularly problematic if the ambient temperature exceeds 35°C

### Steam emission

If correctly installed as described below, there should be no steam emitted to the work area during operation, there may however be some steam emitted when the autoclave door is opened. Under normal circumstances the thermal cooling lock will prevent the door from being opened until most of the steam in the chamber has condensed, however under certain circumstances such as the when the thermal cooling lock override is used significant amounts of steam can be released. Consideration should be given to how this steam may affect smoke and heat detectors etc.

### Floor loading



A 700 litre autoclave weighs in the region of 1000kg. Particularly in the case of refurbishment of an older building it will be necessary to consider the strength of the floor on which the autoclave is stood. It is sometimes, although rarely necessary to fill the autoclave vessel with water at some stage during its life span in order to conduct a hydrostatic pressure test. It may be prudent to take account of this additional weight when considering the floor loading. In normal use larger autoclaves can be loaded with considerable additional weight.

### Extractor Hoods

An extractor hood fitted above the autoclave will eliminate any remaining difficulties related to steam emission, and will also be beneficial in reducing heat build-up. Autoclaves used for processing waste materials may produce unpleasant odours, the autoclaving of waste plastic

ware may also produce potentially harmful fumes, the effects of these will also be minimised by an extractor hood. An air flow rate of 0.5M<sup>3</sup>/sec is often specified for a medium sized autoclave, although this should be considered along with the hood size. It is possible to provide an output from the autoclave to boost fan speed immediately prior to door opening.

The minimum practical size of extractor hood for an autoclave is around 1 metre square. In the case of top loading autoclaves this should be positioned directly above the autoclave. In the case of front loading autoclaves the hood should extend beyond the front of the autoclave by approximately 700mm. This will be sufficient to minimise steam and fume emission into the work area, but it may also be desirable to extend the area of the hood to cover the entire autoclave to reduce the amount of heat released into the room. In the case of direct steam heated autoclaves it may also be advisable to arrange the hood or incoming steam supply in such a way as to cover the incoming steam supply pipe work and reducing valves etc. This will further assist in the elimination of heat build-up within the work area.

The autoclave has castors fitted to allow positioning and should ideally be positioned within easy reach of a suitable isolatable electrical supply and drain. See **Installation**.

All autoclaves during their process cycle will release steam and heat, and this should be taken into consideration when choosing a site in your laboratory in which to install your autoclave.

## **Provision of Space and Access for Accessories**

### **Autoclaves with drain condensers**

Drain condensers are fitted to the rear panel of front loading autoclaves, and require sufficient space to be allowed for pipe work to enter the condenser. Drain condensers for top loading autoclaves are supplied as separate units and consideration should be given to where the condenser is to be located as it may not be practical to site this to the rear of the autoclave. Drain condensers may operate at high temperature depending on final settings, and effectiveness of the cooling water supply. Consideration should be given to heat hazards when deciding on the location of a condenser.

When all pipe work is complete the condenser will occupy a space of approximately 300 x 500mm.

### **Autoclaves with exhaust filtration**

The location of exhaust filters will vary according to the individual specification of the autoclave. In the case of rectangular vessel autoclave the filter is usually fitted inside the autoclave vessel, and in such cases further consideration of the filter location is not necessary.

In the case of top loading and smaller front loading autoclaves it is not possible to locate the filter inside the vessel due to space constraints and limitations of currently available filter mediums. It is then necessary for the filter to be located in a separate pressure vessel outside of the autoclave. External exhaust filter housings are located to the upper rear of the autoclave, and protrude from the left-hand side as viewed from the front of the autoclave by up to 200mm. In normal circumstances the filter housing will fit into the 300mm space already provided to the rear of the autoclave. Special arrangements for the location of exhaust filters can be made on request.



It is normal for exhaust filter housing to reach temperatures in excess of 100°C, therefore consideration should be given to heat hazards when deciding on the location of an autoclave with an exhaust filter. Provision should be made to protect personnel from heat hazards whilst maintaining adequate access for filter replacement. A minimum height of 500mm is required above the top of the filter housing for replacement of the filter.



**Provision should be made to guard or insulate pipes exiting the autoclave where these may present a heat hazard.**

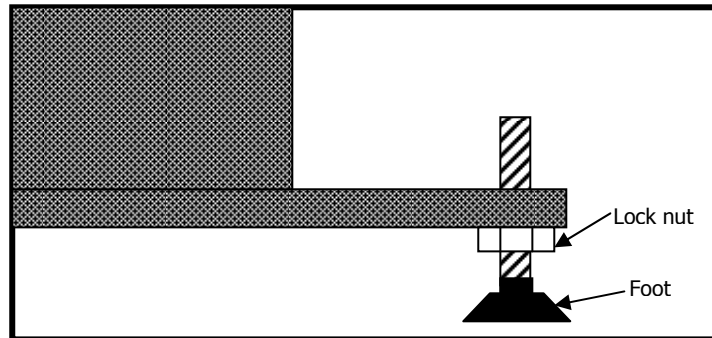
# Installation



## **Important Note – 230L Models**

Before opening the door screw down the two anti-tip feet (fitted at the front of the autoclave) to floor level.

Once the autoclave has been finally positioned, these feet should be securely tightened onto the floor with a spanner. The lock nuts should then be tightened up to the bottom of the autoclave frame.



## **Electrical Installation**



**Please refer to the specification sheet supplied with this autoclave or to the voltage plate at the back of the autoclave for details of the electrical supply required.**

Steam heated models that are not fitted with a vacuum system or an internal steam generator can be connected to a low power single phase electrical supply.

For other models requiring a three phase electrical supply please read the following section.

To connect your Priorclave to the power supply simply connect a suitable cable from your isolator to the isolator on the back of the autoclave. In many cases the isolator will already be connected via a suitable cable and plug. In these cases connect this plug to the matching socket which should be available on your wall.

The electrical supply as per the required specification should be terminated in an industrial socket to BS 4343 (IEC/EN 60309-2) which should be located on the wall to the rear of the autoclave within 2 metres of the connection to the autoclave. The socket should be of the 3P + N & E type rated at 16 Amps.



If not provided as part of the industrial socket a suitable means of isolation is required to be located in a position where it can easily be accessed to terminate power to the autoclave when necessary. The socket and isolator should be installed and tested in accordance with the IEEE Wiring Regulations Sixteenth Edition.



If existing electrical services from a previous installation are used these should be examined and tested in accordance with the above regulations by a qualified electrician.

If installation is ordered the autoclave is supplied with a plug suitable for connecting to a socket of the above specification. This is connected by a 3 metre flexible cable to the rear of the autoclave.



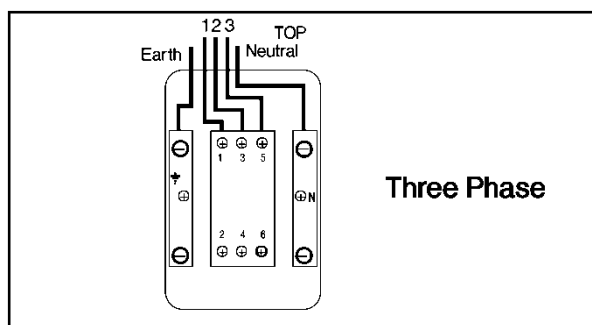
**It is important to note that the earth bonding of the plug and cable arrangement is tested before dispatch from the factory, if it is necessary to remove the plug to make alternative arrangements for connection the installation will require re-testing.**

If a cable and plug are not fitted then your Priorclave can be wired for three phase supplies as shown in the diagram below.



**If a cable has been fitted to the autoclave there should be no need for any further electrical installation.**

The power supply should be a 3 phase and neutral isolated supply, rated at 16 Amps per phase and connected to the isolator as in the diagram below. Sufficient length of cable should be used to allow the autoclave to be pulled out and worked on from the back if necessary. The cable used to the earth line and neutral feeds should be capable of carrying the per phase amperage of the supply.



The neutral line must be nominally at earth potential and must **NOT** be fused.  
This equipment must be earthed.

## Drainage and Exhaust Gas Ventilation

### General



Autoclaves used for processing laboratory waste must be provided with a drainage connection as described below. This is a requirement of British Standard 2646. A connection will also be required if the autoclave is fitted with any freesteaming or vacuum options. The hazard groups below are as defined by the Advisory Committee on Dangerous pathogens as published in *Categorisation of Pathogens According to Hazard and Categories of Containment*.

### ***Extract from BS2646 Part 2 1990***

#### **7.2 Drainage system**

*"The drainage system from the autoclave should prevent dispersion of splashes and steam into the working area. For autoclaves designed for a make-safe process, discharge should be directed to a sealed discharge system; the system should lead by direct connection to a building drain or catchment tank.*

*An open tun dish is not suitable for the discharge line of a laboratory autoclave, which is to be used for a make-safe process.*

*The sealed discharge system should be vented to a high level by a pipe not less than 30mm diameter. The vent pipe should be directed outside the building. Steam should not emit from the vent pipe."*

#### **From Scope of BS2646**



*"This Part of BS2646 gives guidance on the planning for, and installation in laboratories of, autoclaves for the sterilisation of materials and equipment, including those which may be contaminated with organisms categorised as Hazard Groups 1, 2 or 3. It does not cover the installation of autoclaves used for material contaminated with organisms categorised as Hazard Group 4, for which complete containment of condensate is considered to be essential."*

A further comment in a later clause adds...

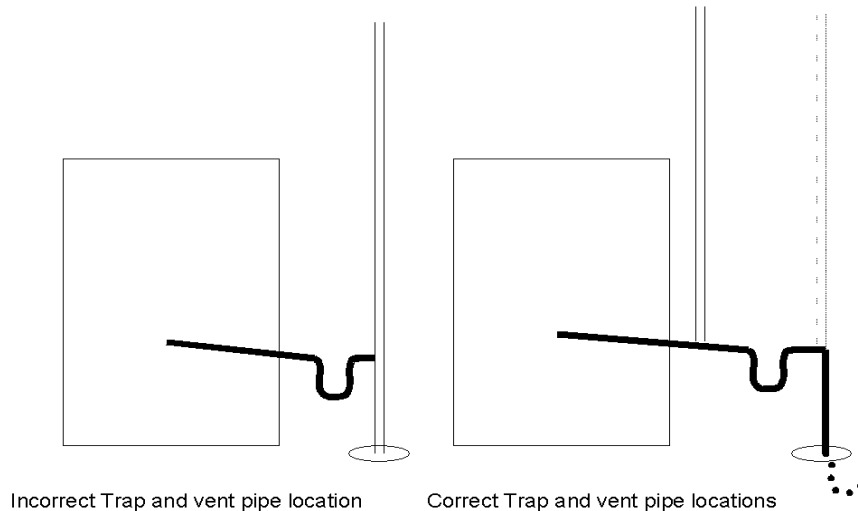
*"In certain circumstances, e.g. special research activities involving high concentration and/or large volumes of agents in Hazard group 3, additional safeguards may be required. The advice of the Health and Safety Executive should be sought in each such case. Further containment than that detailed above, (Generally as described below in this case.) filtration or heat treatment of discharge is only necessary for autoclaves used to process material contaminated with organisms in Hazard Group 4."*



**In case of any doubt the full text of BS2646 should be consulted.**

## **Drainage**

The autoclave requires a sealed connection to a trapped building drain. This drain should be provided with a heat resistant vent pipe of 30mm minimum diameter vented freely to atmosphere at a safe location outside the building. Care must be taken in the design of the drainage connection to ensure that an air break will be preserved at all times to prevent the autoclave from sucking water back from the drain as it cools. Excessive back pressure produced by restrictions in the vent pipe may impair the function of the autoclave. Note that at some stages of the cycle the autoclave may discharge steam under pressure, and if vent flow is inadequate steam may be forced to exit via other interconnected drains.



If possible it is always advisable to connect the autoclave to a drain to cut down on the amount of steam discharged into the laboratory. A compression fitting should be incorporated in the drainpipe in an easily accessible location to enable easy disconnection for maintenance purposes.

All drain piping should head downward towards the drain to prevent water collecting in the pipe.

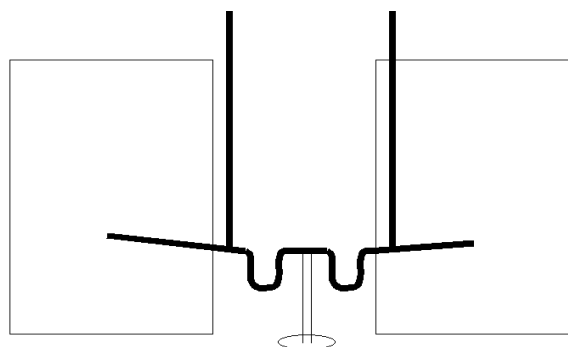


Attention should be paid to the material of the vent pipe as steam and water discharged from the autoclave can be at temperatures in excess of 100°C. In the case of autoclaves with pulsed free steaming, vacuum drying, and vacuum cooling it may be advisable to fit a drain condenser to cool the autoclave discharge, and condense the steam.

The drain and vent pipe should be in place prior to commencement of installation by Priorclave. It will then be possible to make connections from the autoclave directly into the drainage services provided.

The point where connection from the autoclave to the drainage system is made should be within 2 metres of the autoclave. The location of individual connections is shown on the installation drawings.

## **Multiple autoclaves in a single location**



If two autoclaves share a common drain separate vent pipes and traps are required to prevent cross flow of steam and water

If more than one autoclave is to be installed at a single location then the services described need to be provided for each autoclave. If more than one autoclave is utilising the same drain and/or vent arrangement, then there may be problems due to cross flow of effluent between autoclaves. For example if one autoclave is being loaded by the operator whilst the other is in the free steaming stage, then it may be possible for hot air and steam being discharged by one autoclave to enter the other presenting a hazard to the operator. If common services are to be shared it is essential that these are sufficiently isolated from one another to prevent cross flow.

### **Safety Valve**

All autoclaves are fitted with an over pressure safety valve to protect the autoclave from over pressurisation. This valve will emit large volumes of steam in the event of the autoclave exceeding its maximum working pressure. It is a requirement during safety valve function, and routine testing to be able to see and hear if the safety valve has operated.



It is Priorclave's preferred policy to direct the safety valve outlet to discharge to the floor at the rear of the autoclave. Some establishments prefer safety valve outlets to be piped to a high level outside the building. If this is required the pipe work for this should be provided, and terminated within 1 metre of the safety valve discharge point at the rear of the autoclave. All safety valve pipe work should be DN25. A drainage point should be provided at the lowest point of the safety valve pipe work. This should be a pipe of approximately 6mm ID, and should be positioned to discharge into a suitable receptacle to the rear of the autoclave. No valve should be fitted to this drainage point thereby allowing it to act as a "tell tale" indicating if the safety valve is operating. Under no circumstances must any isolating valve be fitted to the safety valve pipe work. External pipe work must be designed to be self draining, and under no circumstances should water be able to collect in a trap, which could freeze in cold weather. See also BS3970 part 1 1990, sections 7.2.4 and 7.2.5.

### **Exhaust filtration (optional)**

If levels of containment of effluent greater than those described above are required it is possible to fit an exhaust filtration system. In such cases all deliberate discharge from the autoclave vessel is passed through a filter with a validated absolute removal capability to particles sizes of 0.01 microns in gas, and 0.2 microns in liquid. Depending on specification filter mediums are either of the sintered borosilicate glass, or PTFE membrane types. Any condensate forming in the pipe work leading to the filter is held within a sealed containment unit, and is then returned to the vessel for sterilization during the next cycle.



**Regular filter replacement is essential throughout the life of the autoclave.**

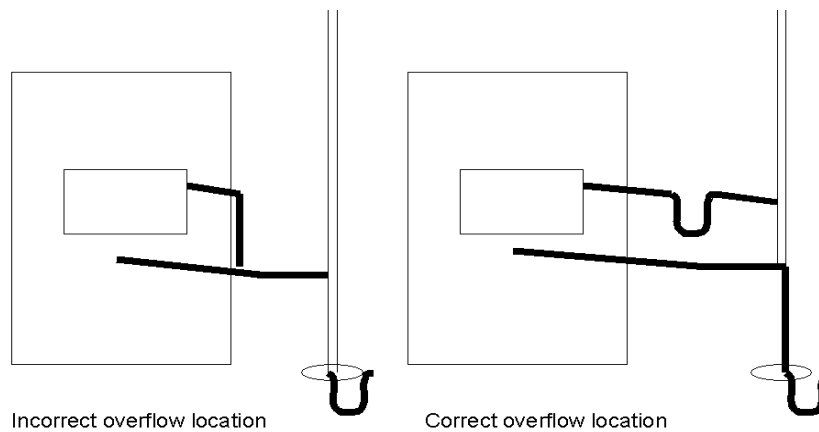
The details of the requirement, or otherwise, for exhaust filtration are beyond the scope of this document and should be discussed with Priorclave technical personnel.

It is not usual to filter discharge from the autoclave safety valve.

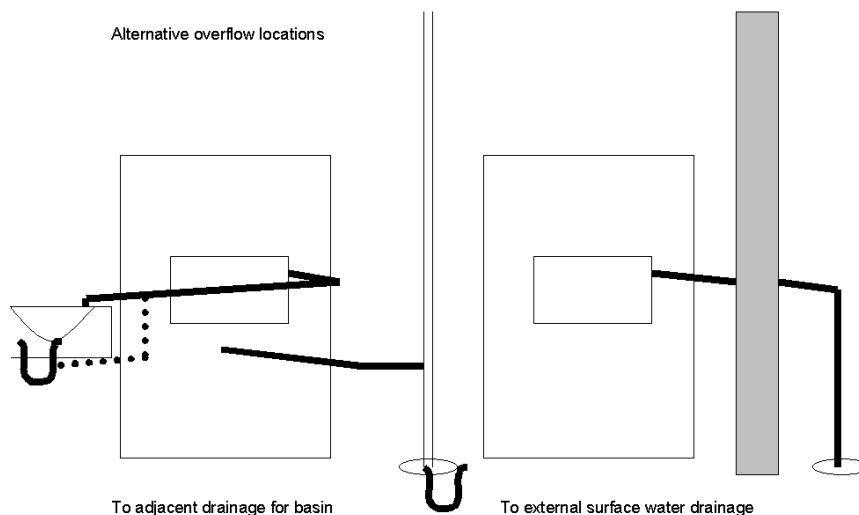
### **Air intake filtration (optional)**

In the case of an autoclave used for the making safe of laboratory waste the above drainage provisions should be adequate. In the case of autoclaves used for processes in which the product is required to be sterile at the end of the cycle it should be noted that air will return to the chamber via the vent pipe work, and will carry with it some airborne contamination. If this is a concern the fitting of an air intake filtration system should be considered. The Priorclave part number for this is **AFL/ACS/SML**. This device ensures that all air returned to the chamber at the end of the cycle is passed through a filter with an absolute removal capability for particle sizes down to 0.02 micron.

### **Autoclaves with water tanks and drip trays**



A separate drain is required for the connection of water tank and drip tray outlets. This may be a common connection to the same drainage system as above, but in such cases a sufficient level of isolation (such as a deep trap) is required to prevent the cross flow of steam between the drains. The drip tray and water tank overflow can be connected to an open tundish if desired. This has the advantage of making any discharge from the overflow visible, which is in accordance with water bylaws.



## Water Supplies and Backflow Prevention

### The Water Supply (Water Fittings) regulations 1999



**Note:** The fluid categories below relate only to the above regulations, and are in no way connected with the containment categories previously discussed with reference to drainage and containment of pathogens.

It is mandatory that the completed installation complies with the Water Supply (Water Fittings) regulations 1999 – SI No 1148. This will be dependent on factors outside of the autoclave such as the layout of the water supply provided. The location and usage of the autoclave will determine the fluid category for which backflow prevention measures are to be taken, however it is suggested in the guidance notes to the above regulations that all laboratories in industrial and commercial installations are considered category 5. Prevention measures suitable for fluids in this category may therefore need to be considered.

The backflow prevention measures already provided within the autoclave are as follows:

### Autoclaves with Automatic Water Fill Systems and Liquid Ring Vacuum Pumps

Water is fed to the autoclave vessel and vacuum pump via a header tank with air gap and circular overflow, which is classified type AF. This alone will provide backflow prevention measures suitable for fluids up to category 4. Provided that the supply to the autoclave is delivered via a header tank with similar prevention means elsewhere in the building the installation will form an air gap with interposed cistern of type AUK, which is suitable for fluids

up to category 5. Separate header tanks for each of these functions are provided allowing the automatic water fill tank to be fed from a treated water supply, and the vacuum pump to be fed from an untreated supply to economize on the use of treated water if required. Considerations for the use of treated water are discussed later.

### **Autoclaves with Water Cooled Condensers and Water Jackets**

For installations falling into lower fluid categories it will be possible to use mechanical means to prevent back flow such as a verifiable single, or non verifiable double check valve. For higher fluid categories non mechanical means such as break tanks must be applied. Due to the pressure and flow rates required for the condensers to work effectively it is not practical to provide header tanks locally to the autoclave. The condenser and or jacket will work more effectively when more cooling water flow is achieved across the condenser, therefore the more head of water that can be provided the better.

Arrangements to meet the backflow prevention requirements will therefore need to be made at a high level. If a water feed from a suitable header tank arrangement to satisfy the regulations cannot be provided it will be necessary to take other measure such as the provision of a break tank and pump arrangement locally to the autoclave.

## **Other services**

### **Steam Supply & Connection**



The autoclave requires a dry saturated steam supply regulated to approximately 3 bar/43psig, supplied via a 100 mesh strainer. A suitable pressure reducing valve should be provided along with 2 x 100mm pressure gauges showing regulated and unregulated pressure, these should be located within view of the intended site of the autoclave.

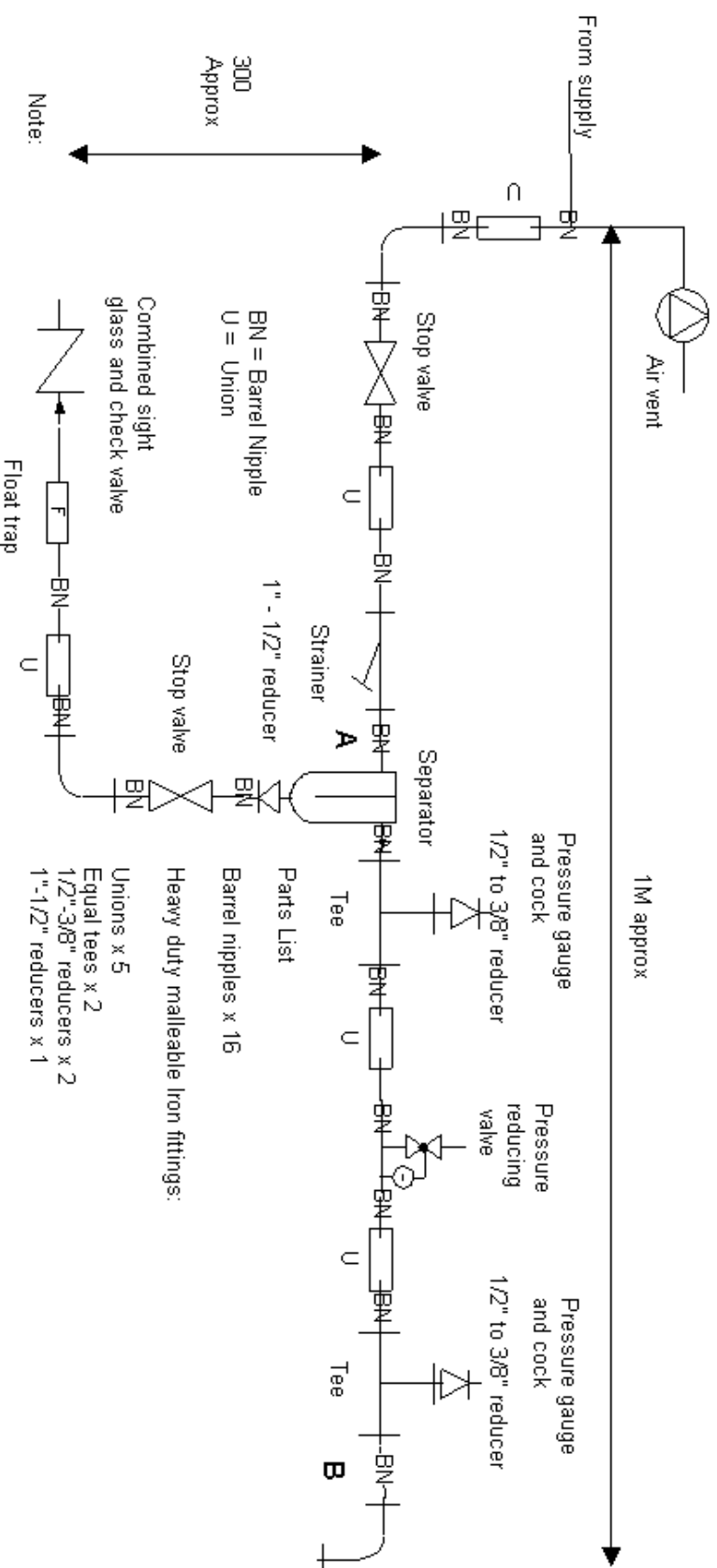
A condensate trap set should be located in the supply within 1 metre of the connection to the autoclave. If required for the satisfactory operation of the reducing valve a condensate trap set should be located in the supply to the pressure reducing valve.

If a steam quality test port is required this should be incorporated into the supply pipe work.

The autoclave will be supplied with a flexible steam hose of 1 metre in length. The steam supply should be terminated with a 1/2" BSP/ DN15 female thread within 1M of the connection to the autoclave to permit connection of the flexible hose. Hoses in 2 and 3 metre lengths can be supplied at no additional charge if requested, however the shorter length is recommended for better appearance and reduced condensate accumulation. Longer hose lengths must be specified in writing to your nominated Priorclave project manager prior to delivery of the autoclave. Delivery and repeat visit charges may be incurred if this is not done.

Typical steam trap/pressure reducing valve assembly

Rev 2171002 T.Ashenden



The length of the assembly can be increased by replacing the standard barrel nipples at locations A and B with made to length parts.

It may be necessary to vary the range of the 10 bar pressure gauge and pressure reducing valve spring depending on incoming steam pressure.

Recommended pipe thread sealant Tretite black graphite.

To mount pressure gauges in front of pipe specify "U" type syphons,  
To mount above pipe specify "Pig Tail" syphons.

1 x stainless steel braided flexible steam hose screwed 1/2" bsp male both ends, with swivel fitting 1 end.

Spirax Sarco components:

- 0601000 00 1/2" HV3 GM stop valve BSP x 2  
1636600 00 1/2" fig 12 SG strainer BSP + 100 ss x 1  
0230200 00 S1 SG separator BSP x 1  
1440200 00 1/2" FT14-14 TV steam trap BSP R/L x 1  
1000100 00 1/2" DP17 pressure reducing valve BSP (blue spring)  
0273360 00 4" pressure gauge (3/8" bottom entry) set with syphon & cock 4 bar  
0273360 00 4" pressure gauge (3/8" bottom entry) set with syphon & cock 10 bar  
1/2" sight Check with gunmetal body and borosilicate glass tube  
1/2" AV13 air vent screwed BSP

A manual isolation valve should be fitted to the steam inlet line (a DN15 isolation valve is supplied with the autoclave).

The f diagram above shows a typical, but by no means definitive example of a reducing valve and trap set arrangement, which could be used to serve a single autoclave. Priorclave can provide assistance in planning a steam arrangement for a whole suite of autoclaves if required.



**In the case of removal of an existing autoclave consideration should be given to which parts of the steam supply are integral to the old autoclave. It is possible that some parts may need to be retained, and re-mounted to suit the new autoclave.**

### General

All water supplies should be terminated on the wall to the rear of the autoclave, at a point within one metre of the point of connection to the autoclave.

In hard water areas it will be necessary to use softened water for the supplies to the autoclave to prevent scaling of the autoclave vessel and heating elements. Hard water can also reduce the life span of liquid ring vacuum pumps and drain condensers when fitted, however the cost of supplying treated water to these may be considered prohibitive, and if this is the case, then a second water supply will be required. If the autoclave is to be connected to a distilled or de-mineralised water supply care should be taken to guard against the corrosion of copper pipe work due to excessive purity of the water supply. The water level detection system of most autoclaves is operated on a conductivity-based system, due to this feed water requires a minimum conductivity level of 10-15 micro Seimens.

Autoclaves with an automatic water fill system require a DN15 water supply terminated in an appliance tap with a suitable connector for a standard appliance hose.

Autoclaves with liquid ring vacuum pumps require a further DN15 water supply terminated in a 1/2" BSP/DN15 compression fitting.

Autoclaves with drain condensers require a water supply for the condenser. The size of connection for this will vary depending upon the specification for the individual autoclave. In most cases a supply in DN20 will suffice, however in some cases expanding up from a DN15 supply locally in the area of the autoclave may not provide a sufficient water flow to reduce the autoclave discharge to the desired temperature.

**Consideration should be given to the discharge from the Vent and Safety Valve outlets, which should be directed in such a way as to not cause a hazard. This will be determined by the location of the autoclave.**

## Initial Commissioning

Priorclave Autoclaves are given a full operational test before leaving the factory and as such arrive ready for immediate use after initial installation. It is advisable however to run a simple cycle with the autoclave empty before processing a working load to check that no problems have arisen during transport.

If commissioning has been ordered with the autoclave this will be carried out by a Priorclave technician otherwise follow this simple procedure to check the operation of your Priorclave.

1. Follow the door opening instructions in the **Operating Summary** section above.
2. Set the temperature to 121°C and the process time to 15 minutes using the arrows under the displays.
3. Follow the door closing instructions in the **Operating Summary** section above.
4. Wait a few seconds for the 'Start' indicator to illuminate, and press the 'Start' button to begin the cycle.
5. During the cycle, check that there are no problems during heat-up and process.
6. Following successful completion of the commissioning cycle your Priorclave is ready to process its first working load.

Please refer to the **Operation** section later in this manual before running your first working load as this gives further details on operation of the autoclave and on the control options which may be

fitted

If you experience any problems during this procedure please contact Priorclave service or your local agent.

## **Full Commissioning and Performance Qualification**

If you are having the unit commissioned by a Priorclave technician this will be a simple matter of checking for correct installation, checking that all functions are operating correctly, and familiarising you with the autoclave. There are however some benefits that can be gained from having your Priorclave commissioned to suit your particular loads and requirements. Some examples of settings that can be optimised during commissioning, and the advantages these can provide are listed below.

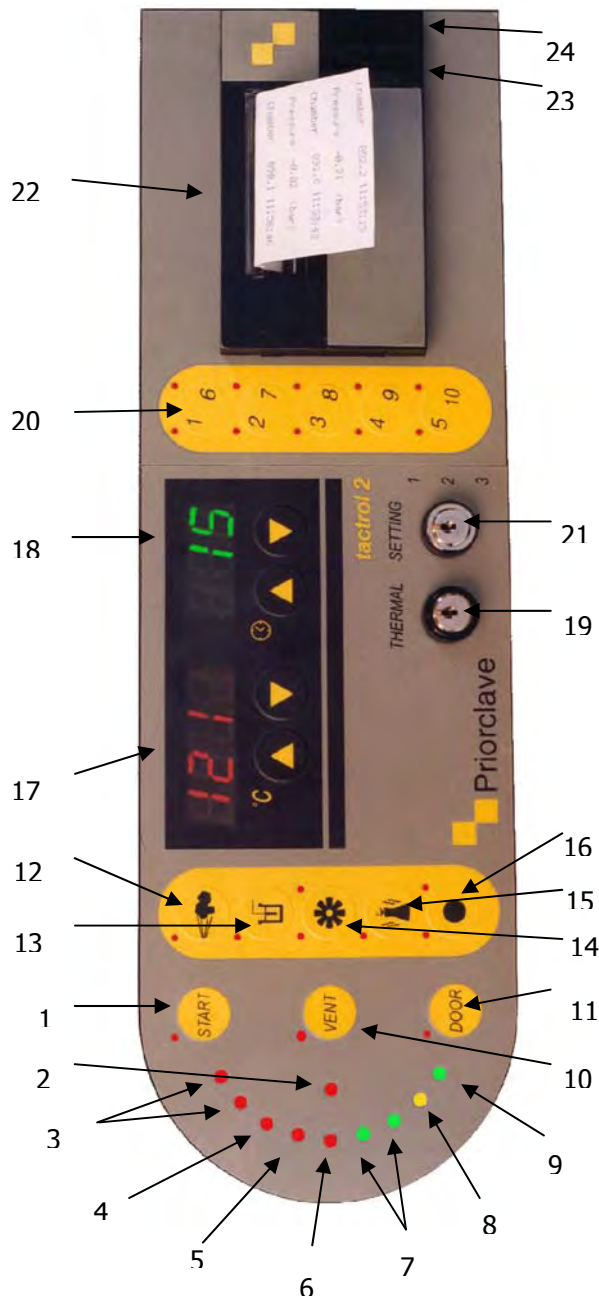
- Establishing optimum freesteam temperatures for effective air displacement.
- Establishing optimum freesteam time for effective air displacement, whilst eliminating unnecessary time and energy consumption
- Establishing optimum process time and temperature to ensure complete sterilisation, whilst maintaining minimum cycle time and energy consumption.
- Setting thermal lock release temperature to suit your particular load, to eliminate unnecessary cooling time whilst ensuring safety.

If you feel that any or all of the above would be of use to you then please contact Priorclave Service.

## Layout Diagram



# Control Panel Layout



## Key

1. Start Button/Indicator
2. Pre-Cycle Vacuum Indicator
3. Heat Indicators
4. Freesteam Indicator
5. Heat-up to Process Indicator
6. Process Indicator
7. Cooling Indicators
8. Complete Indicator
9. Media Warming Indicator
10. Vent Button/Indicator
11. Door Button/Indicator
12. Freesteam Select Button/Indicator
13. Load Sensed Process Timing Select Button/Indicator (optional)
14. Cooling Select Button/Indicator
15. Media Warming Select Button/Indicator
16. Vacuum Select Button/Indicator (optional)
17. Temperature Display/Setting
18. Timer Display/Setting
19. Thermal Lock Keyswitch

## Optional Fittings

20. 5/10 Program Memory Buttons/Indicators
21. Setting Lock Keyswitch
22. Printer
23. Paper Advance Button
24. Printer Door Open Button

## Operation



Before using your Priorclave for the first time check that the circuit breakers and isolator (at the back of the autoclave) are switched on. If your autoclave is fitted with vacuum options, or a steam generator also ensure that the water supply is switched on. Also check that the steam supply (or steam generator if fitted) is turned on and that there is adequate pressure available (3.5 Bar).



**N.B.** Before proceeding please check the specification sheet at the front of this manual to establish which options and accessories, if any, are fitted to your Priorclave. This will determine whether you will need to read the instructions for these options later in this manual.

### Opening the Pressure Door.

1. Switch on the power at the isolator. All indicators will light momentarily and a sounder will bleep. This is to enable the indicators to be checked. The **start** indicator should now be lit.
2. Press and release the '**Door**' button on the control panel. There will be a bleep and the message '**HOLD**' will be displayed in the timer display. Wait for a short time until the timer display returns to normal, there is another bleep and the '**Door**' indicator illuminates.



(The **vent** button will light when the **door** button is pressed and remain lit after the door is opened.)

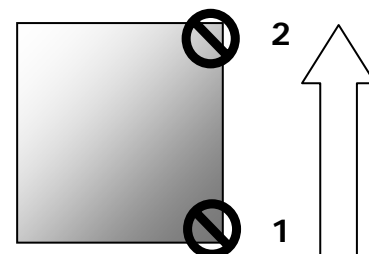
During the waiting time the '**HOLD**' message in the temperature display confirms that the autoclave is waiting during its safety delay.

3. Check that the pressure gauge is reading zero and you may now press and release the '**Door**' button. On pressing the **door** button a second time, you will hear the locking bolt withdraw.
4. When the lock is released a green indicator lamp below the lower hand wheel will illuminate
5. You may now fully unwind the black (Lower) handwheel.



**Do not try to undo the handwheels against the lock before it has released or damage to the locking solenoid may result.**

6. Unwind the red (Upper) safety handwheel. In the unlikely event of undetected residual pressure being present the red safety bolt prevents the lid from being blown open by breaking the gasket seal whilst retaining the lid, thus allowing the pressure to escape safely from around the edge of the lid. The autoclave is additionally fitted with a pressure switch, which prevents the solenoid lock from operating if pressure is detected within the autoclave.



7. Once all the bolts are fully released the door can be carefully opened.



**NOTE: Care should be taken when opening the door as it will be hot and steam may be released. Heatproof gloves and a faceshield should always be worn when unloading autoclaves.**

### Loading

8. The autoclave can now be loaded with the items to be sterilised either directly onto the shelves, in baskets, or watertight discard containers in the case of waste loads which may leak liquids when autoclaved.
9. If fitted the centre shelf is retained at the back to prevent tipping when extended and is prevented from being accidentally removed by pulling forwards. To remove this shelf lift it at the front and gently push it back until the anti-tip catches are released from the back of the runners.



Care should be taken when loading the baskets or containers not to pack them too tightly with material. Ample room must be allowed for steam to penetrate the load properly or full sterilisation will not be achieved. When using autoclave bags these should be left open with the top of the bag rolled outwards, exposing the load to the steam inside the pressure vessel. Care

should also be taken that the contents of bags and containers are not able to spill over into the body of the autoclave vessel. Any such spillage could block pipes and valves and will not be covered by the warranty.

Tests have shown that the depth of un-perforated discard containers should be no greater than 180mm (7") for effective air displacement from the load. Suitable containers are available from Priorclave.

## Settings

10. Once the autoclave has been satisfactorily loaded the controls should be set for the process cycle that you require.

If your autoclave has a setting lock fitted this must be set to **position 3**.

## Sterilising Temperature & Time Settings.

The Medical Research Council has recommended the following temperatures and times as being sufficient for complete sterilisation in autoclaves:

**126°C for 10 minutes.**

**121°C for 15 minutes.**

**115°C for 30 minutes.**

These temperatures and times relate of course to load temperatures and the aim in setting a cycle should be to achieve one of the above criteria in the coldest part of the load. Some loads however are sensitive to elevated temperatures for prolonged periods, making full achievement of the above impractical. However the disinfection of such loads after a short cycle, without necessarily reaching full Sterilising Temperature, is usually sufficient for most purposes.

Should you require a more precise method then the optional **Load Sensed Process Timing** may be of assistance for certain load types. If your autoclave is fitted with this option please refer to section 6 of this manual.

Since there is a time and temperature 'lag' between the temperature controller probe and the load, this should be compensated for either by increasing temperature or process time, or by including in the cycle a period of free steaming with the vent open at 100°C. This can be achieved by pressing in the **vent** button manually and releasing it manually.

Alternatively, the **Automatic Freesteaming** function can carry out this process automatically if the option is selected.

If you have an interest in any of the options mentioned above, which can quite easily be retrofitted; please contact Priorclave Technical Services Department.

In conclusion, when setting up the autoclaving cycle a large safety margin should be allowed within the settings.

Carrying out a 'worst load' test can assess more precise settings.

## Setting the process time.

The process timer can be set to a time up to 999 minutes. Simply pressing the time up/down buttons sets the time required. The set time is displayed until the set temperature is reached, then the process time begins counting down to zero in increments of one minute.



## Setting process temperature.

Pressing either the up or down button momentarily causes the current set temperature to be displayed. Subsequent use of the up/down buttons changes the set temperature. If no keys are pressed for a short time, the display returns to showing the current chamber temperature.



## Selecting other functions

The function select keys may be used to switch the Media Warming Option, and optional functions such as **Rapid Cooling**, on or off at any time other than when a cycle is running. An indicator

illuminates to show that a function has been selected. If **Automatic Timed Freesteaming**, **Vacuum Options** or **Load Sensed Process Timing** are not fitted pressing the appropriate key will result in a visual and audible fault being signalled and the function will not be selected.

Possible selections are:



### Rapid Cooling

A powerful fan is fitted to the autoclave to direct cool air over the autoclave vessel.

If selected by using the **cooling** button, the fan will switch on automatically during the cooling stage of the cycle. There are three possible settings for rapid cooling, and these operate as follows:

- Off -** No indicators lit.  
The fan does not operate at all during the cycle.
- Immediate start -** Left hand indicator lit. - 1 press of the **cooling** button.  
The fan starts as soon as the cooling stage is reached
- Delayed start -** Both indicators lit. - 2 presses of the **cooling** button.  
The fan starts after the autoclave chamber has cooled to 100°C. This setting is useful when autoclaving some fluid loads, as bringing the cooling on at temperatures above 100°C may reduce the chamber pressure too rapidly, causing the load to boil.

**In both cases the fan will switch off automatically when the cycle has reached the complete stage.**



### Automatic Free-Steaming

#### What is freesteaming?

Incorporating a period of freesteaming into a cycle can improve air removal in difficult loads and/or reduce temperature lag between the load and the autoclave, reducing process time at higher temperatures. Freesteaming introduces a stage during heating up to process temperature, when a solenoid valve at the rear of the autoclave is opened for a pre-set time. The valve opens at a factory set temperature of just above 100°C and is held open for the time set as detailed below. During this time steam is being generated in the chamber in large volumes and this creates turbulence as it passes through the load before escaping through the valve. It is this turbulence that can assist with air removal.

#### Setting the freesteam time.



If freesteaming is required this is selected by pressing the **freesteam** button.

The indicator lights up to show that freesteaming is selected. The time display will now flash indicating that the freesteam time, not the process time, is currently being displayed. The freesteam time can now be set (in minutes) using the up/down buttons. If no further changes are made for a short time the display stops flashing, and reverts to showing process time. If you wish to check the freesteam time or make further changes then freesteaming should be deselected, then reselected.

#### Freesteam temperature setting

If your autoclave is equipped with timed freesteaming, this will commence at a temperature slightly above 100°C, which has been set at the time of manufacture. If required qualified personnel may increase this temperature, and the turbulence caused by the escaping steam pressure can further assist with air removal. It is desirable however to connect the autoclave to a drain and vent pipe (as described in Installation), as the release of pressurised steam into the laboratory should be avoided.



### Pulsed Freesteaming

With certain loads and in certain situations the efficiency of the freesteaming process can be improved by pulsing. If this option is fitted to your autoclave then freesteaming commences as described above but at a higher temperature. Instead of remaining open for the entire

freesteaming period the vent valve shuts off at a lower temperature (usually about 107°C). The autoclave then heats up again to the temperature at which the vent valve opens again. The autoclave will continue this cycle for the time set when selecting freesteaming. This continual pulsing of steam out of the autoclave creates considerable turbulence within the autoclave, helping to draw trapped air out of the load.

All Priorclaves fitted with freesteaming can be configured for pulsing by qualified personnel, however connection to a drain and vent pipe as described in Installation is essential.



## **Load Sensed Process Timing**

### **Function**

If this option is fitted, the autoclave will be provided with an additional thermocouple. This is a PTFE coated stainless steel armoured probe, which can be positioned in the load, ideally in the coolest part. When this option is selected, the autoclave will heat to the set chamber temperature as normal. However, when the set temperature is reached the process time will not begin to count down until the load temperature, as sensed by the additional thermocouple, reaches a temperature just below the set chamber temperature. The cycle will then proceed in the usual manner.

### **Purpose**

The use of load sensed process timing can greatly assist with the sterilisation of certain types of difficult dense loads, such as large baskets of bottle caps, pipette tips or animal feed, by ensuring that the load reaches set temperature. The system is also very effective for bagged plastic waste loads, however as these tend to melt down around the probe, consumption of probes can be high. For this type of use load validation may prove to be more successful and economical in the long term.

### **Load Sense Probe Positioning**

The probe should be positioned in what is anticipated to be the slowest part of the load to heat for example the centre of a large densely packed load, or the largest of a group of filled bottles. This is important, as there may be large variations in temperature distribution throughout the load.



**NOTE: Temperature variations can be reduced by the use of timed free steaming (see above).**

### **Load Sense Thermocouples**

The load sensed process timing option utilises a thermocouple connected directly to the main processor board via a plug and socket connector for ease of replacement.

Replacement thermocouples are available from Priorclave.

See Maintenance for details on thermocouple replacement.



## **Media Warming**

If this highly useful feature is selected the autoclave will cool to a factory pre-set temperature of 45°C. The temperature will then cycle between approximately 45° to 55°C until the door is opened. This allows, for example, nutrient media to be held as a liquid until it is needed.

### **Delayed Start Time**

The autoclave can be set before a cycle to start at a pre-set time.

To access this settings turn & hold the thermal lock key in the override position. Press the time up or down keys. Release the thermal lock key. 1 is displayed on the temperature display, by default 0 will displayed on the time display. The temperature display now shows the number of a list of operating parameters, the value for the parameter is shown in the time display. Scroll through the list of available parameters using the temperature up/down keys.

After no keys are pressed for eight seconds the display returns to normal.

The function of these settings is as follows:

	Temp. Display	Time Display	Function	Action
	1	0-24	Delayed Start Time Hour <sup>+</sup>	Enter required Start time hour (24 hour clock)
	2	0-60	Delayed Start time Minute <sup>+</sup>	Enter required Start time minute
	3	0/1	Start Delay Select On/Off <sup>+</sup>	0= OFF 1= ON
<sup>+</sup>	<p>The time is set in real time, therefore the clock has to be correctly set for this to work properly.</p> <p>After one delayed start operation, delayed start automatically switches off, and the autoclave returns to normal operation.</p>			

Instructions for setting the clock time and for other operator settings please refer to the section **Changing Date & Time** later in this manual.



## Vacuum Options

It is strongly recommended that to achieve optimum performance from Priorclaves fitted with vacuum options that commissioning and/or load validation tests are carried out by a trained Priorclave engineer. If no particular programs have been specified your autoclave will be factory set with the following programs:

**Program 1: Non vacuum Cycle**

**Program 2: Pre-Cycle Vacuum and Vacuum Cooling**

**Program 3: Pre-Cycle Vacuum and Vacuum Drying (if specified, otherwise as program 2)**



### Pre-Cycle Vacuum

The pre-cycle vacuum is selected using the lower function select key on the control panel. With the left-hand upper indicator lit the Pre-Cycle Vacuum is selected. With the Pre-Cycle Vacuum selected a vacuum pump will run at the beginning of the cycle, removing much of the air from the autoclave and load. At a pre-set level of vacuum the control system switches off the pump and the normal cycle begins. If set at commissioning a number of vacuum stages will be performed, with heating stages in between. Pre cycle vacuum is essential when autoclaving loads containing densely packed porous material.



### Drying Cycle - Suitable for Non Media Loads Only

A drying cycle can be selected by means of the lower function select key. With the option selected the lower left-hand lamp will illuminate. When this option is fitted it can be run along with or separately from a Pre-Cycle Vacuum. With the option selected, at the end of the process dwell time the water charge is drained under pressure from the autoclave, and the autoclave cools to a pre-set temperature. When this temperature is reached the fan switches off, a partial vacuum is drawn and heater mats attached to the outside of the vessel are switched on. This has the effect of evaporating liquid on the load. After a pre-set time air is admitted to the vessel and this process is repeated a number of times. At the end of this stage the autoclave passes immediately to cycle complete.



Post cycle drying **must not** be selected if the load contains bottled liquids, regardless of how these are contained. All liquids in the load will be evaporated. Sealed containers of liquid will explode. Unexploded containers will be in a dangerously unstable condition when removed.



### Vacuum Cooling - Suitable for Non Media Loads Only

If fitted along with Vacuum Drying this option must be selected for attachment to a particular program in the control software during commissioning.

A vacuum cooling cycle can be selected by means of the lower function select key. With the option selected the lower left-hand lamp will illuminate. When this option is fitted it can be run along with

or separately from a Pre-Cycle Vacuum. With the option selected, at the end of the process dwell time autoclave vent is opened, and the autoclave cools to a pre-set temperature. If cooling has been selected the fan will operate at this stage. When this temperature is reached the fan continues to run and a partial vacuum is drawn. This has the effect of evaporating liquid on the load causing it to cool rapidly. After a pre-set time air is admitted to the vessel and this process is repeated a number of times. At the end of this stage the autoclave passes immediately to cycle complete.



Post cycle vacuum cooling **must not** be selected if the load contains bottled liquids, regardless of how these are contained. All liquids in the load will be evaporated. Sealed containers of liquid will explode. Unexploded containers will be in a dangerously unstable condition when removed.



### **Steam Generator On/Off switch**

If the autoclave is fitted with an internal Steam Generator, this switch activates the generator. For more details of the generator please refer to the steam generator manual in the Other Options Fitted section of the manual.

The generator is on when the switch is illuminated.



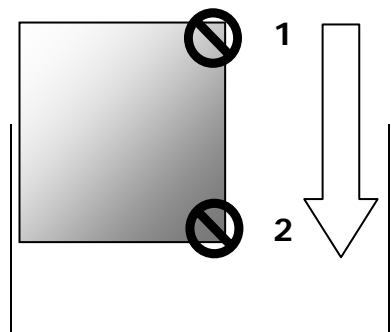
When switching on the generator please ensure that the water supply is connected and on

The generator will take between 20 and 30 minutes to heat up and stabilise. The pressure in the generator is shown on the Generator Pressure Gauge on the control panel. Once this reaches a level of around 3.5 Bar the autoclave can be used.

### **Closing the pressure door.**

11. When you have set up the cycle parameters close the autoclave door, taking great care not to slam it shut as this will result in damage to the closure bolts, and secure it with the Upper safety hand-wheel. You may hear a clicking as the hand-wheel is turned down indicating that the microswitch under the hand-wheel has closed. Continue to turn the bolt until tight.

12. Press and release the 'door' button to release the door lock. There will be a bleep and the lock will immediately withdraw. The green indicator lamp below the lower hand-wheel will illuminate whilst the lock is withdrawn. Secure by fully tightening the lower hand-wheel. If any difficulty is encountered, open the door and check for obstruction.



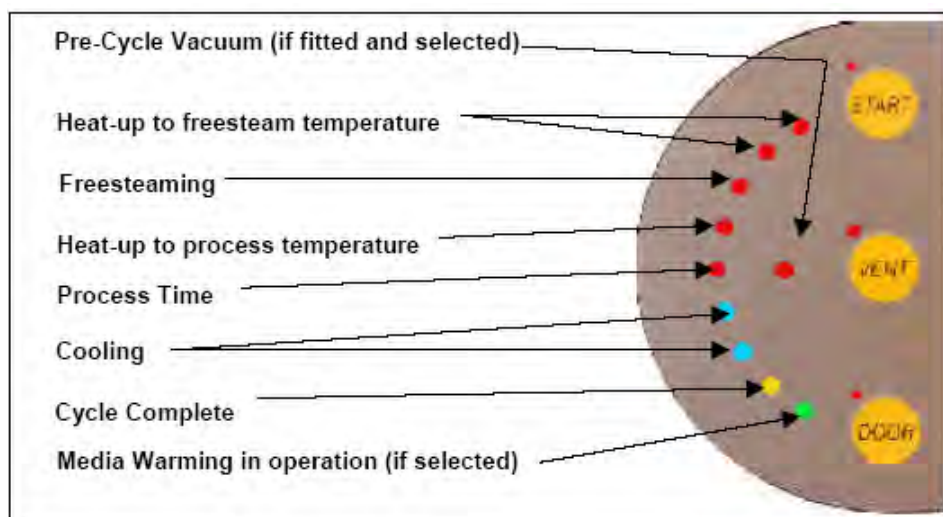
The lock is held open for a pre-set time after which it will re-set and the green indicator lamp below the lower hand-wheel will switch off. If this occurs before you have been able to close the door then simply press and release the 'door' button to release the door lock again.



**Attempting to undo the hand-wheels before pressing the door button and releasing the locks is not good practice. This will lead to excessive strain on the locking solenoid, which may cause it to fail.**

### **Starting a cycle**

13. Ensure the door is properly secured and the **start** indicator is illuminated. To start the cycle simply press the **start** button. The first light of the cycle status indicator bar will illuminate and the autoclave will now gradually heat up to process temperature. On vacuum cycles the Pre-Cycle Vacuum indicator will light up. The cycle status indicator will also advance through its stages to give 'at a glance' indication of the cycle's progress.
14. Once a cycle has been started the function selection settings cannot be changed; attempting to do so will cause a fault to be signalled. If changes are required the cycle should be aborted by pressing the **start** button again.
15. On Priorclaves not fitted with a setting lock keyswitch changes can be made to the process time and temperature settings once a cycle has started. At the end of the cycle the time setting will reset to its original setting.



## Vent button

10. The **vent** button may be used at any stage during the cycle. When used it opens a large bore solenoid vent valve at the back of the machine. It may be left open for free steaming to achieve better steam penetration of the load if **Automatic Freesteaming** has not been selected. Care should be taken with this manual method however as failing to switch the **vent** off will eventually cause the autoclave to run dry, aborting the cycle. It may also be used with certain loads as a means of rapidly venting the autoclave. If used for manual free steaming the **vent** button must be manually released before pressure will build up and process temperature can be achieved.



**Care should be taken if using the vent button when the autoclave is pressurised. Venting of the autoclave under these circumstances with a liquid load may lead to the load boiling over and glassware may be broken.**

## During the process time

11. Once set temperature is reached, the process time will begin to count down and the process indicator will illuminate. If the Load Sensed Process Timing Option is fitted and selected there may be a delay between the autoclave reaching set point and commencement of the process time whilst the load reaches set temperature.
12. During the process time a check should be made that there is correct correlation between temperature and pressure readings on the control panel. A steam table is included at the back of this manual for this purpose. The check should be made to ensure that air has been properly purged from the autoclave. Generally, a pressure reading higher than would be expected will indicate entrapped air in the autoclave.
13. If for any reason the temperature is forced outside of a pre-set band, or power to the autoclave is removed during the process time, the cycle will abort and the fault indicator will illuminate and a fault code of either **F005** or **F006** will be shown in the temperature indicator. This is to ensure that loads that have not been subjected to the required cycle parameters are not assumed to have been processed correctly. The fault condition is cancelled by:

**If no setting lock keyswitch is fitted:**

pressing the reset button on the top right hand side of the back of the autoclave,

or

**If a setting lock is fitted:**

turning the setting lock key to the enable position and then to the disable position. If the lock was in the enable condition when the fault occurred, then it must first be turned to the disable position.

## Cooling

14. After completion of the process time the autoclave moves into the cooling part of its cycle, and this is shown on the cycle status indicator in green. If **Cooling** has been selected this will be

switched on automatically according to the cooling strategy selected. Otherwise cooling will be by convection.

## Thermal lock

15. Under normal circumstances the autoclave cannot be opened until the temperature of the load simulator probe, which has a cooling rate assimilated to a bottle of fluid, has fallen below 80°C at which point the yellow bar on the cycle status indicator will illuminate. The temperature shown by the temperature indicator will be significantly below 80°C as this measures the temperature in the open chamber space. Pressing the door button before the thermal lock has released causes a fault to be signalled. The temperature at which the thermal lock operates is factory set. This can be reset but must only be done following commissioning by qualified personnel. The thermal lock can be overridden using the key-switch on the control panel. The keys for this switch are provided in this manual.



**Overriding the thermal lock will cause the main vent to open. Great care should be exercised when using the key-switch since liquid loads could boil over if vented at elevated pressures.**

16. There are circumstances, however when quicker access to the load is required. When this is necessary, first abort the cycle by pressing the start button. Then turn the key into its horizontal position and holding it in this position, press the **door** button and wait while the **HOLD** message is displayed until the **door** lamp illuminates. Finally press the **door** button to release the door lock. The thermal lock key can now be released. If the key is released before this stage then the **HOLD** display will not reset and the autoclave cannot be opened. To reset the display, repeat the above procedure and open the autoclave.



**Great care should be exercised when using the Thermal Lock Override, especially with liquid loads. Even at temperatures below 100°C a liquid load in sealable glass containers will not be safe. For the above reasons only responsible personnel should keep the Thermal Lock Override key in a safe place away from the autoclave.**



Under certain cycle abort or failure conditions the thermal safety lock can latch in the locked condition. This is because the control system will always go to the safest condition if there is any uncertainty about the cycle end circumstances. To overcome this simply go through the door open or close procedure using the thermal lock override key. Operation will return to normal as soon as the next cycle is completed satisfactorily

## Cycle complete

17. When cooling to the 'thermal lock deactivation temperature' is complete, the **complete** indicator will illuminate, and the autoclave will emit a bleep for a short time (about 10 seconds). If the Cooling System is selected it will automatically switch off at this point. The autoclave is now ready to open and unload.

## Media Warming

18. If this has been selected, the autoclave will remain at the pre-set temperature after the cycle is complete, until the door is opened or the cycle otherwise aborted.
19. **Opening the autoclave to unload and re-load for the next cycle is simply a repetition of steps 2-7.**

## Aborting a Cycle

On occasions it may be necessary to abort a cycle before its completion. In order to do this, simply press the start button.

## Operation with Options & Accessories

The following descriptions detail how to operate and gain maximum benefit from the options and accessories that may be fitted to your Priorclave.

### Multi Program Memory Options

When this option is fitted, five program number keys are provided to the right of the control panel, each with two indicators. The indicators on the left are for programs 1 to 5 and those on the right for programs 6 to 10. If the Priorclave has been specified with a five program memory only the first five programs will be active. As each program number is selected, the indicator illuminates and the previously selected indicator is cancelled. Pressing the select button toggles between the two program numbers shown on the button.

When the program memory option is fitted a three-position setting lock keyswitch is fitted. These setting positions allow different levels of access to settings as follows.



**Position 1.** Only the currently selected program can be run  
Program settings cannot be changed.

**Position 2.** All programs can be selected and run.  
Program settings cannot be changed.

**Position 3.** All programs can be selected and run.  
Program settings can be changed freely.

**The setting lock key can only be removed in positions 1 and 2.**

Programming of settings is the same as with the standard machine, but the required program number should be selected before setting. The settings entered can then be recalled for subsequent use by simply reselecting that program number.

### Setting Lock Keyswitch Option

Fitted on Priorclaves without program memory to give an optional level of security this keyswitch has two settings only, which are equivalent to positions 1 & 3 above. The key can only be removed in position.

### Printer

The printer if fitted is mounted on the right hand side of the control panel. This provides a useful record of the cycle as well as an indication if any faults have occurred. The information printed is as follows:

USER NAME (if provided at time of ordering)

DEPARTMENT (if provided at time of ordering)

AUTOCLAVE SERIAL NUMBER

DATE

CYCLE NUMBER

PROGRAM NUMBER (if multi-program memory option fitted)

TEMPERATURE AND TIME AT CYCLE START (time is set to G.M.T)

TEMPERATURE AND TIME AT END OF FREESTEAMING

TEMPERATURE AND TIME AT START OF PROCESS TIME

The temperature and time are then recorded at pre-set time intervals, until the end of the process time.

TEMPERATURE AND TIME AT END OF PROCESS TIME

TEMPERATURE AND TIME AT CYCLE COMPLETE.

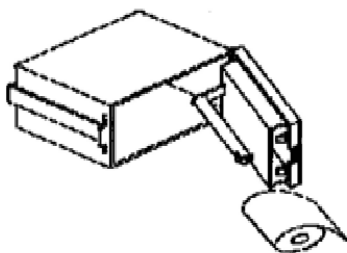
CYCLE PASS/FAIL/ABORT

(Fail means that a fault signal has occurred during the cycle or that the cycle was aborted. See - Warning Indicators)

The above information will be printed in the order listed, allowing the information to be read as it is printed.

### **Power On Self Test**

The self test procedure is initiated by applying power to the printer while the paper feed button is depressed. When the paper feed button is released a test print will be produced.



**Correct Paper Path**

### **Replacing the Paper Roll**

Access to the printer for changing the paper roll is provided by a hinged front panel. The spring-loaded catch on the left-hand side of the printer front panel should be depressed to release the front panel.

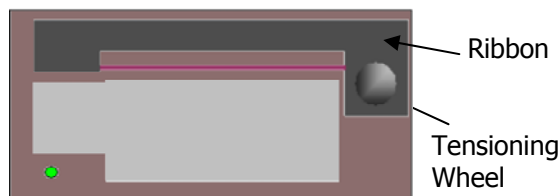
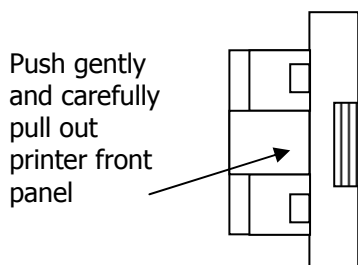
The paper roll carrier is mounted on the rear of the printer front panel and will swing out from the main body for ease of roll changing.



**Use the correct paper. Suitable paper is available from Priorclave Service or your local agent.**

### **Changing Printer Ribbon**

With the door of the printer open gently squeeze the plastic cover inside the printer door at the points shown in the diagram. The outer door cover should come away (some gentle twisting may be required) exposing the print ribbon mounting plate as shown below.



**Ribbon fitting detail**

The old print ribbon can be lifted out and a new one put in its place. If necessary take up any slack on the ribbon with the tensioning wheel.

The paper should pass between the ribbon and the bottom of the ribbon cassette.

The two parts of the door can now be pushed together and will click into position.

## **Air Intake Filter**

When fitted to the autoclave this system ensures that air drawn into the autoclave during the cooling stage of the cycle is first passed through a bacteriological air filter. This filter is fitted at the back of the autoclave.

## **Internal Validation System**

If fitted this system continuously monitors the performance of the temperature reading and control system with reference to an internal reference standard. If any problem is detected with the system the autoclave is stopped and a fault is signalled. (See Warning Indicators and Fault Codes for details.)

## Vent Filter



When fitted to the autoclave this system passes all autoclave discharge through a filter fitted inside a pressurisable stainless steel housing. At the end of the cycle any unfiltered condensate from the filter housing is returned to the autoclave. The correct operation and effectiveness of the filter system should be regularly checked. Please refer to the manufacturers instructions enclosed with this manual.

## Loading Trolleys and Cassette

### Standard Loading Trolley

The Trolley has been manufactured for loading baskets or containers onto the lower shelf of the autoclave.



When loading and unloading the trolley the rear wheels should be locked, preventing movement of the trolley.

### Adjustable Height Trolley

This is a hydraulic loading trolley to assist with easy loading and unloading of the autoclave to both the lower and central shelf.

The trolley includes a foot pedal to raise the loading level and a handle to lower it, so that the loading cassette can be placed at a comfortable height for loading with individual containers and can then be raised to a suitable height to load the autoclave.



When loading and unloading the trolley the rear wheels should be locked, preventing movement of the trolley.

### Trolley with Loading Cassette

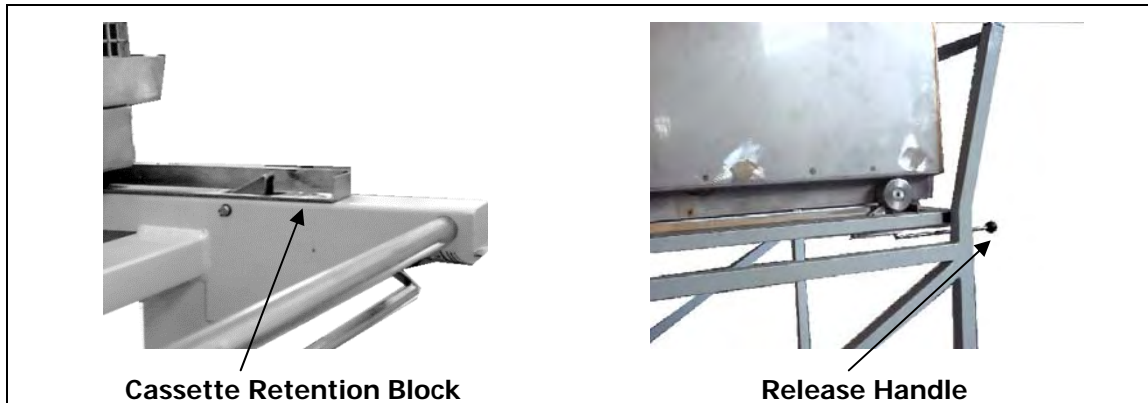
Where the autoclave is provided with a loading cassette the loading trolley may be of either of the two types described above.

When loading and unloading the cassette from the trolley to the autoclave the rear wheels should be locked, preventing movement of the trolley.



During movement of the cassette and trolley the cassette is held in place by a retaining block in front of the rear wheel. When loading the cassette into the autoclave this block should be released by holding down the release handle until the rear wheel has run past the block.

When loading the cassette onto the trolley from the autoclave be sure to take the cassette to the back of the trolley so that the sprung block can retain it in place.



### **Setting Lock Keyswitch Option**

Fitted on Priorclaves without program memory to give an optional level of security this keyswitch has two settings only, which are equivalent to positions 1 & 3 above. The key can only be removed in position 1.

### **Chart Recorder**

If fitted, the recorder power input is connected directly to the autoclave in such a way that the recorder will only operate during the autoclave cycle, i.e. from the pressing of the start button to cycle complete. At this time power to the recorder is cut. Unless otherwise specified, single channel units record the temperature of a fixed thermocouple probe, and in the case of two channel units the second channel records the temperature of the load probe.

## Changing Date & Time

A number of additional control system settings can be accessed via a "Hidden Menu".

To access these settings turn & hold the thermal lock key in the override position. Press the time up or down keys. Release the thermal lock key. 1 is displayed on the temperature display, by default zero will displayed on the time display. The temperature display now shows the number of a list of operating parameters, the value for the parameter is shown in the time display. Scroll through the list of available parameters using the temperature up/down keys.

After no keys are pressed for eight seconds the display returns to normal.

The function of these settings is as follows:

Temp. Display	Time Display	Function	Action
1	0/1	Start Delay Select On/Off <sup>+</sup>	0= OFF 1= ON
2	0-24	Delayed Start Time Hour <sup>+</sup>	Enter required Start time hour (24 hour clock)
3	0-60	Delayed Start time Minute <sup>+</sup>	Enter required Start time minute
* 4	0-999	Print Interval	Enter time (minutes)between printing during process time (0= printer disabled)
5		Year Setting	Enter Year
6		Month Setting	Enter Month
7		Date Setting	Enter Day of month
8		Hour Setting	Enter Hour (24 Hr Clock)
9		Minute Setting	Enter Minute
10		Second Setting	Enter Second.
		<b>Scroll back up to parameter 1 to confirm the new or current time settings.</b>	
11		Not Currently Used	

<sup>+</sup> The time is set in real time, therefore the clock has to be correctly set for this to function properly.

After one delayed start operation, delayed start automatically switches off, and the autoclave returns to normal operation.

### \* Models fitted with 5 or 10 Program Memory

Setting marked \* are program number related, and therefore should you wish to use different values for these in different programs this can be done by changing the value when the correct program is selected.

## Warning Indicators and Fault Codes

On the control panel there are a series of 'hidden until active' warning indicators. Some of these indicators will appear in conjunction with a fault code in the temperature display. The meaning of these warnings, why they appear, and what to do when they appear, is as follows.

### **SERVICE**

This means that 500 cycles, or six months have passed since the autoclave was last serviced. The engineer will cancel the message when the autoclave is serviced.

### **WATER + FAULT CODE F004**

The water level has fallen below the minimum level and must be topped up before the autoclave can be run. The warning will automatically cancel when the door is opened and the water level is topped up. The low water condition may have caused a running cycle to abort, and the load may need to be autoclaved again.

### **O/HEAT + FAULT CODE F003**

If fitted, the heater over-temperature protection thermocouple may have sensed that the heating element became too hot. This is probably due to a low water condition, which was not sensed by the low water probe. The water level and the condition of the probe (see Maintenance) should be checked before attempting to use the autoclave again.

If heater over protection is not fitted then the over-heat cut out will only operate under extreme conditions, such as a failure of the temperature control system. The next attempt to run the autoclave should be closely observed and if problems persist contact Priorclave Service.

### **FAULT + FAULT CODES F000, F002, F005, F006, F007, F008, F009, F010 & F011**

The fault indicator illuminates under conditions that may invalidate the autoclaving process, and may result in the load requiring to be autoclaved again. The fault condition will be triggered by any of the following:

- F006** Power to the autoclave being interrupted when a cycle is in the heating or process dwell stage of the cycle.
- F005** The chamber temperature falling below the set temperature by more than 3°C during the process dwell time.
- F002** Failure of the temperature control, display, or load simulator thermocouple.
- F000** If your autoclave is fitted with the optional self-validation system, an error in the temperature measurement system is signalled by fault code **F000**. Usually this would mean that a critical error has developed in the temperature measurement system, however, as the detection system is extremely sensitive it is possible that it may be triggered by fluctuations in the electrical power supply. If fault code **F000** appears it may be cleared by the method described below. If the fault code will not clear, or continues to re-appear then the user cannot correct the fault. In such a case please contact Priorclave service or your local Priorclave approved service agent.
- F007** Vacuum stage timeout (loop break). The autoclave has not achieved the pre-set level of vacuum during the Pre-cycle vacuum stage during the pre-set time.
- F008** Heating stage timeout. The autoclave has not reached process temperature within the Pre-set time.
- F009** Vacuum cooling set-point not achieved. The autoclave has not achieved a low enough level of vacuum during the post cycle vacuum stage (Vacuum Cooling or Drying Cycle)
- F010** Air detector input activated. If fitted the air detector system has detected an over pressure condition symptomatic of excess air remaining in the load.
- F011** Printer Timeout / Malfunction. The control system has not received confirmation from the printer within its pre-set timeout.
- F012** Door micro-switch fault. If a door micro-switch opens during a cycle this fault code is displayed

- F013** Jacket Timeout -If a jacket is fitted it has not reached the required temperature within the Pre-set time. This would indicate a problem with steam supply or inlet or drain valve operation
- F014** Jacket Over temperature - If a jacket is fitted the temperature has exceeded the pre-set alarm temperature
- F015** Jacket under temperature - If a jacket is fitted the temperature has fallen below the pre-set operating temperature band.
- F016** Water Fill Timeout - The upper level water probe level has not been reached within the allowed time for filling and the filling operation has been stopped. This function prevents continuous unsupervised operation of the water fill, which could lead to flooding.
- F017** FreeSteam - During Pulsed Freesteaming operation the lower of the two set temperatures has not been achieved. The temperature has not fallen sufficiently following the opening of the vent valve.

### **LOCK**

This warning will light when the thermal lock keyswitch is in the override position.

### **LOAD + FAULT CODE F001**

This warning is activated in the event of the failure of the load sensing thermocouple. If the autoclave is fitted with load sensed process timing, this should be deselected to enable the autoclave to run without this feature. The thermocouple should be replaced as soon as possible. Great care should be taken to ensure that loads which would ordinarily be autoclaved with load sensed process timing are adequately sterilised.

### **CANCELLING FAULT MESSAGES**

The fault messages are cancelled by first correcting the source of the original fault, then turning the setting lock key switch to position 3. If a key-switch is not fitted they are cancelled by pressing the reset button.

If 2 or more faults occur at the same time, the one with the highest priority is displayed. (F000 is the highest priority and F012 is the lowest.) If a higher priority fault is cleared it will be replaced by the next active fault, unless this too is cleared by the same action.

# Maintenance



Before carrying out any maintenance work check the autoclave for any visual signs of materials which may be contaminated or damaged. Should any such matter be apparent contact the relevant person of authority before proceeding.



Do not carry out any work unless you are competent to do so. Items in this section marked with \* are those which require a level of competence as incorrect maintenance or fitting could lead to a safety hazard.



**DISCONNECT** or **ISOLATE** the machine from mains power supply before removing any panels or commencing any maintenance work.



Ensure that any electrically locked doors or canopies are open before disconnecting power.



We fully recommend that a qualified technician regularly services an autoclave of this complexity and the details given here reflect this. The instructions given here are mostly confined to maintenance operations that can be carried out by the autoclave user on a routine basis.

**IN THE EVENT OF ANY DIFFICULTY** or doubt about any maintenance or service procedure contact Priorclave Limited or your nearest Priorclave approved agent or supplier immediately.



Access to the inside of the autoclave frame must be restricted to trained and authorised personnel only. This area can be dangerous with access to electrical connections and hot pipe work.

## Weekly Maintenance

### Vessel Cleaning

Check the front of the machine and the inside walls of the pressure vessel for general cleanliness, particularly around operating parts and switchgear. Under no circumstances should an abrasive or chemically aggressive cleaner be used on the pressure vessel. The use of chlorine or hydroxide based cleaners is not recommended (see notices at the beginning of this manual).



If destruct type loads are regularly being processed consideration should be given to the use of suitable containers for such loads to minimise spillage. A range of such containers suitable for individual Priorclave models is available from Priorclave.

### Gasket

To prolong the life of the sealing gasket it is advisable to lubricate the sealing faces. This is carried out with the pressure door in the open position by applying high melting point grease to the exposed surfaces of the gasket, after cleaning the gasket and inspecting for damage. A silicone grease such as high vacuum grease is ideal for this purpose.

### Door & Closure Bolts

Check that the door is opening and closing freely. Visually inspect the gasket for any signs of abrasion, damage or wear.

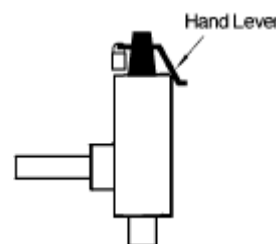
To ensure a free action of the closure bolts they should be kept lubricated and free from dirt. The threads of the bolts and the threaded holes in the header ring should be thoroughly cleaned and then lubricated with high melting point grease.

### Drainage

If the autoclave has been plumbed directly into a drain using tubing, this should be checked for any signs of blockage, obstruction or damage. Also ensure that both ends of the tube are connected as originally intended. Check for any obstruction to the safety valve outlets, which must remain exposed and unconnected to any form of drainage at all times.

### Safety Valve \*

The safety valve should be periodically checked for freedom of movement. This can be done without the need for removing panels from the machine, as the hand lever of the valve may be accessed from above the back panel of the autoclave. When the autoclave is at working pressure, keeping well clear of the safety valve outlet, lift the hand lever and check for a free flow of steam from the outlet pipe. If steam does not flow the valve should be replaced or serviced by a qualified person immediately. After releasing the lever ensure that the steam flow stops fully.



## Monthly Maintenance

To be carried out in addition to weekly maintenance programme.

### Cleaning

Check exterior of machine and inside pressure vessel for general cleanliness, particularly around operating parts and switchgear. Wipe away any spilled media, chalk, limescale, etc. in the bottom of the vessel. This build up should be minimised by the use of a discard load container. Under no circumstances should an abrasive cleaner be used on the pressure vessel. The use of chlorine or hydroxide based cleaners is not recommended (see notices at the beginning of this manual).

### General Operation

The general operation and performance of the autoclave should be observed frequently, and any fault or defect reported or rectified immediately, and entered into the notes section of the operating manual. (This will assist the service engineer in locating any persistent fault and reporting it to the manufacturer.)

### Vacuum Pump and Water Pump

The correct operation of these should be checked regularly. Please refer to the manufacturers manuals for these pumps.

### Water Header Tank (vacuum models)

The condition of the float valve tank and its various connections should be periodically checked and cleaned if necessary. Particular attention should be paid to ensuring that there are no restrictions to the tank overflow. In hard water areas the function of any anti-scaling device fitted to the water supply should be tested

## Quarterly Maintenance

### Hinge

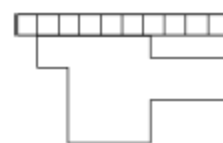
With the pressure door in the open position the hinge should be cleaned and lubricated with high melting point grease.

### Automatic Air Purge Valve and Condensate Trap Valve\*

It is advisable to replace the expanding switching element and other sealing parts contained in this unit on a regular basis, in order to prevent build up of foreign matter which may impair the operation of the unit. The air purge valve (if fitted) is situated to the rear of the pressure vessel just below the top and the condensate trap valve is fitted underneath the autoclave vessel in the drain line towards the rear of the autoclave.



To remove the parts for replacement simply unscrew the top cap of the unit and remove. Re-assemble the unit as per the instructions in the repair kit (available from Priorclave Limited or local agent). Should the top cap prove particularly tight the complete valve should be removed from the pressure vessel and the body gripped in a vice to remove the cap, as excessive localised pressure could damage the pressure vessel.





Care should be taken when refitting the valve to the pressure vessel that all gaskets etc., are replaced in the correct position and the unit should be checked for leaks when first re-pressurised.



Although visually similar, a different element is fitted in the air purge valve to that fitted in the condensate trap. If the correct element is not fitted then problems with either air removal or with water build-up in the vessel could result.

### Microswitches \*

To ensure the reliable operation of the autoclave the internal microswitches, one located behind the red safety closure bolt and the others below the locking catch and behind the black closure bolt should be regularly cleaned and checked.

To gain access to these switches remove the right hand side panel. First, carefully clean around the microswitch under the locking catch and check this for damage and ease of operation. Repeat this process for the microswitches behind both locking bolts.

Then screw down the safety bolt to its closed position and check the position in which it is operating the switch.

Care should be taken to ensure that this switch is not operating too soon before the sealing gasket is effectively compressed and clamped.

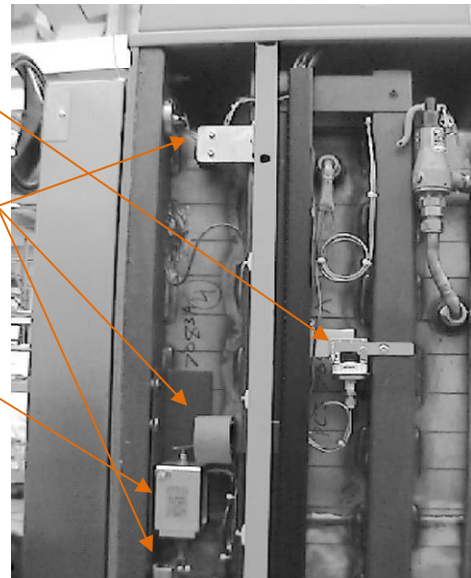
If so, adjust the position of the switch until correct operation is achieved.

The switch should operate approximately 1/3 of a turn before the bolt is fully tight. Then, manually lifting the locking catch check the operation of the other two microswitches when the lower bolt is operated.

Pressure Switch

Microswitches

Solenoid



**Closure Mechanism Detail**

### Locking Solenoid \*

With the right hand side panel removed, check the locking catch and solenoid for freedom of movement. If necessary the screws should be tightened and the solenoid re-aligned with the catch. A small amount of grease should be applied to the sliding parts if dry.

### Filters (If fitted)



Outlet filters, where fitted should be regularly inspected, sterilised and replaced. **Inadequate maintenance could cause a significant biohazard.** Please refer to the enclosed manual for the filter system for more details.

## **General Maintenance**

### Removing Side Panels \*

Loosen the screws at the front of the panel then remove the screws holding the panel along the top and the top back corner. Then carefully remove the screw in the bottom corner and lift the panel off taking care that it does not drop to the floor.

### Access to control components \*

To access the control components remove the top cover from the control box.



**Access behind the autoclave panels and inside the control box must be restricted to trained and authorised personnel only. This area can be dangerous with access to electrical connections and hot pipe work.**

### **Checking Temperature Control and Pressure Gauge \***

Should a constant deviation from the values shown in the steam table (appendix B) be apparent in these instruments first follow the relevant procedures in the fault-finding table (appendix A). With all of these possible causes eliminated, proceed to check the gauges as follows:

First, place a thermocouple probe connected to a digital thermometer or chart recorder of known accuracy onto the Temperature Controller Probe. Then set the machine and run through a standard cycle. When the process time has commenced check the reading shown by the temperature display against that of the thermometer or recorder. Should there be a disparity of readings in the order of that previously noted then it is likely that the Temperature Controller is at fault and needs resetting.

If only negligible temperature disparity is apparent, however, and the steam pressure is still varying from the expected value by the amount noted previously, then the pressure gauge is probably faulty and in need of replacement.



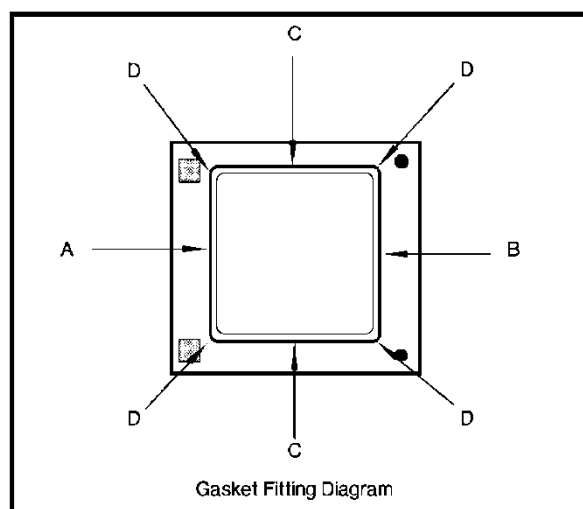
**The pressure gauges and control system fitted to Priorclaves are extremely reliable instruments and as such are unlikely to produce false readings. Therefore it is more likely that any deviation from the values given in the steam table is caused by incorrect air purging etc.**

### **Fitting A New Door Gasket \***

When it becomes necessary to replace the gasket, simply remove the old gasket by pulling it out of the groove in the pressure vessel body.

Using an abrasive pad clean out the groove and wipe away any residue with a cloth. Locate the joint in the new gasket and press this part of the gasket firmly into the part of the groove closest to the hinge, marked A on the diagram.

Find the opposite centre line of the gasket and press firmly into the point marked B on the diagram, ensure that there is an even amount of gasket each side of points A and B. Press the gasket into the points marked C, again ensuring that there is an even amount of gasket between all 4 points.



Press the gasket into the four points marked D. Finally press in the remaining points taking care not to cut the gasket on the header ring. Once the gasket is fully fitted smear the top surfaces with high temperature silicone grease if required, and smooth out any lumps, applying pressure in a circular motion around the gasket.

With the new gasket properly fitted, it may now be necessary to follow the door adjustment procedure. Please note however that the gasket will bed down considerably when the autoclave is first used.

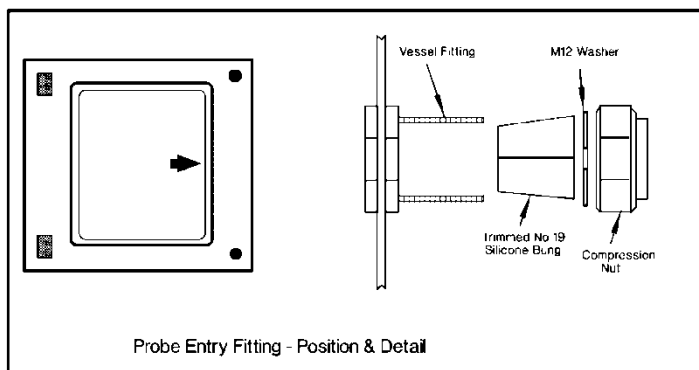


**After changing a door gasket it is necessary to check that any adjustments that may have been made to the door positioning and microswitch settings during the lifetime of the previous gasket are re-adjusted. These procedures are best carried out by a Priorclave trained technician.**

### **Fitting a New Wandering Thermocouple\***

The thermocouple passes through an entry gland located in the right hand side of the pressure vessel, which is accessed by removing the patch panel. To remove the old thermocouple undo and remove the compression nut from the fitting (see diagram).

From the inside of the pressure vessel push out the silicone rubber bung from the fitting, using a suitable blunt instrument and remove it from the thermocouple. It may be necessary to re-slit the bung to do this.





Place the nut washer and bung in position on the new thermocouple and re-fit. It is advisable to apply some silicone sealant (such as bath sealant) to the joint to assist sealing. The joint should be checked for leaks when the autoclave is first pressurised. Replacement bungs are available from Priorclave, or alternatively use a silicone rubber bung and trim the top end by about 5mm.

## Spares List.

A full selection of spares are available from Priorclave Service or your local Priorclave dealer. Please give your autoclave serial number when ordering parts.

**A selection of the more commonly used parts is listed below:**

Description	Part Number	
Air Intake Filter	AFL/ACS/SML	
Gasket	GAS/RSC/230	
Setting Lock Keyswitch	KEY/SLK/001	
Thermal Lock Keyswitch	KEY/TLK/002	
3 Pole Circuit Breaker 32A	MCB/ACS/032	
Single Pole Circuit Breaker 6A	MCB/ACS/006	
15mm (1/2") Solenoid Valve (Steam inlet)	MID/VVC/007	
Door Roller Microswitch	MSA/RSC/ROL	
Door Microswitch	MSA/RSC/GBT	

Wandering Thermocouple Probe	PRB/ACS/004	
Pressure Gauge	PSG/ACS/001	
Pressure Switch	PSS/SWI/001	
Large Cable Port Bung	SBG/ACS/022	
Small Cable Port Bung	SGB/ACS/015	
Door Locking Solenoid	SOL/RSC/001	
15mm (1/2") Strainer	STR/ACS/015	
22mm( 3/4") Strainer	STR/ACS/022	
Output Card	TAC/OPT/001	
Condensate Trap 15mm (1/2in)	VCE/ACS/001	
Condensate Trap Element (E-Fill)	VCE/ACS/002	

15mm (1/2 in BSP) Non Return Valve	VNR/ACS/015	
22mm (3/4 in BSP) Non Return Valve	VNR/ACS/022	
28mm (1 in BSP) Non-Return Valve	VNR/ACS/028	
Air Purge Valve (Complete)	VPC/ACS/001	
Air Purge Valve Element	VPE/ACS/002	
Safety Valve Complete	VSC/ACS/022	
15mm (1/2 in ) Solenoid Valve	VVC/ACS/001	
22mm (3/4 in BSP) Solenoid Valve	VVC/ACS/022	
Vent Valve 28mm (1in BSP)	VVC/RSC/028	
Printer Ribbon Cassette	ZZZ/RIB/002	
Printer Paper Roll	ZZZ/ROL/005	

## Specification table

PS/RSC/SH285		
General	Model	Rectangular Section Priorclave
	Capacity	230 Litres
Dimensions	Machine (wxd)	760x1025mm
	Installation Area Required with door fully open (wxd)	960x1985mm
Weight	Unloaded	580kG
Electrical	Power Supply Required	230 50Hz 6A (varies with options fitted)
Steam	Steam Supply Required	Dry Steam Reduced to 40psi
Drainage	Main Drain Connection	28mm BSP
	Secondary Drain Connections	15mm BSP
Max. Sound Level	Without Vacuum Pump	Approx. 30db @ 1M
	With Vacuum Pump	Approx. 75db @ 1M
Max. Heat Emission	Full Cycle	$((21h \times 10.5p) \times 0.75) / t$ kW/Hour Where: <b>h</b> = heat-up time (hrs) <b>p</b> = process time (hrs) <b>t</b> = Total cycle* (hrs) * to thermal lock temperature

PS/RSC/SH285		
General	Model	Rectangular Section Priorclave
	Capacity	285 Litres
Dimensions	Machine (wxd)	760x1155mm
	Installation Area Required with door fully open (wxd)	960x2115mm
Weight	Unloaded	620kG
Electrical	Power Supply Required	230 50Hz 6A (varies with options fitted)
Steam	Steam Supply Required	Dry Steam Reduced to 40psi
Drainage	Main Drain Connection	28mm BSP
	Secondary Drain Connections	15mm BSP
Max. Sound Level	Without Vacuum Pump	Approx. 30db @ 1M
	With Vacuum Pump	Approx. 75db @ 1M
Max. Heat Emission	Full Cycle	$((21h \times 10.5p) \times 0.75) / t$ kW/Hour Where: <b>h</b> = heat-up time (hrs) <b>p</b> = process time (hrs) <b>t</b> = Total cycle* (hrs) * to thermal lock temperature

**PS/RSC/SH350**

<b>General</b>	<b>Model</b>	Rectangular Section Priorclave
	<b>Capacity</b>	350 Litres
<b>Dimensions</b>	<b>Machine (wxd)</b>	760x1325mm
	<b>Installation Area Required with door fully open (wxd)</b>	960x2285mm
<b>Weight</b>	<b>Unloaded</b>	660kG
<b>Electrical</b>	<b>Power Supply Required</b>	230 50Hz 6A (varies with options fitted)
<b>Steam</b>	<b>Steam Supply Required</b>	Dry Steam Reduced to 40psi
<b>Drainage</b>	<b>Main Drain Connection</b>	28mm BSP
	<b>Secondary Drain Connections</b>	15mm BSP
<b>Max. Sound Level</b>	<b>Without Vacuum Pump</b>	Approx. 30db @ 1M
	<b>With Vacuum Pump</b>	Approx. 75db @ 1M
<b>Max. Heat Emission</b>	<b>Full Cycle</b>	$((21h \times 10.5p) \times 0.75) / t \text{ kW/Hour}$ <p>Where: <b>h</b> = heat-up time (hrs)  <b>p</b> = process time (hrs)  <b>t</b> = Total cycle* (hrs)</p> <p>* to thermal lock temperature</p>

## Notes

[illegible]

## Appendix A - Fault Finding & Rectification Guide

<b>Symptom</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
<b><u>No Power</u></b>	<ul style="list-style-type: none"> <li>- Power switched off at isolator</li> <li>- Circuit Breaker Tripped</li> <li>- Electrical Failure</li> </ul>	<ul style="list-style-type: none"> <li>- Check</li> <li>- Reset and check cause</li> <li>- Call Engineer</li> </ul>
<b>Cycle does not commence when start button is pressed (Fault indicator flashes)</b>	<ul style="list-style-type: none"> <li>- Door is not closed correctly</li> <li>- Microswitch Failure</li> </ul>	<ul style="list-style-type: none"> <li>- Open &amp; Reclose. Check Red Safety bolt is correctly closed.</li> <li>- Check Microswitches</li> </ul>
<b>Heating slow or not apparent</b>	<ul style="list-style-type: none"> <li>- Temperature incorrectly set</li> <li>- Circuit Breaker Tripped out</li> <li>- Insufficient steam pressure</li> <li>- Steam Inlet Solenoid Failed</li> <li>- Fault in control circuit.</li> </ul>	<ul style="list-style-type: none"> <li>- Check setting &amp; reset if necessary</li> <li>- Check Circuit Breaker position. Check cause of trip &amp; reset if necessary.</li> <li>- Check steam supply</li> <li>- Check &amp; Replace as necessary.</li> <li>- Check all connections &amp; output board function.</li> </ul>
<b>Autoclave does not pressurise</b>	<ul style="list-style-type: none"> <li>- Vent button in open position</li> <li>- Freesteam time not completed (if option is fitted)</li> <li>- Air purge valve failure</li> <li>- Vent Valve stuck open</li> <li>- Safety Valve stuck open</li> <li>- Door incorrectly closed</li> </ul>	<ul style="list-style-type: none"> <li>- Check Vent Indicator</li> <li>- Check Cycle Progress Indicator Display</li> <li>- Check and replace internal parts or valve.</li> <li>- Check &amp; Replace if necessary</li> <li>- Check for obstructions on lifting handle.</li> <li>- Check door position and microswitch setting</li> </ul>
<b>Incorrect Temperature/Pressure Correlation</b>	Air not fully purged. Due to :	
	<ul style="list-style-type: none"> <li>- Incorrect Load Packing</li> <li>- Faulty Air Purge Valve</li> <li>- Faulty Controller or Gauge</li> </ul>	<ul style="list-style-type: none"> <li>- Re-Load and re-start cycle with (more) freesteaming.</li> <li>- Check &amp; Replace if necessary</li> <li>- Check function and calibration</li> </ul>
	- <b>Temperature set too high</b>	- Check Temperature Setting
	- <b>Inlet Solenoid Failure</b>	- Check & Replace if necessary.
	- <b>Safety Valve Faulty</b>	- Check the lock on the valve is intact and has not been tampered with and that the lifting handle is not obstructed. Check the pressure shown on the gauge is above 2.2 Bar. If not replace the valve.
	- <b>Output board Failure</b>	- Check & Replace if necessary.

<b>Symptom</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
<b>Door will not open once Autoclave has cooled to 80°C</b>	<ul style="list-style-type: none"> <li>- Thermal Lock Temperature not yet reached in Load Simulator</li> </ul>	<ul style="list-style-type: none"> <li>- <b>WAIT.</b> Thermal Lock is set to Load and not Chamber temperature.</li> </ul>
<b>Door does not open when door button is pressed</b>	<ul style="list-style-type: none"> <li>- Safety delay not completed</li> <li>- Thermal Lock Temperature not yet reached in load simulator</li> <li>- Faulty Door system</li> <li>- Thermal Lock previously overridden</li> </ul>	<ul style="list-style-type: none"> <li>- Wait while '<b>HOLD</b>' is displayed in the temperature display</li> <li>- Check Cycle Complete indicator is lit on cycle progress display.</li> <li>- Check Door Fault Indicator Lamp and Door Functions.</li> <li>- Use thermal lock key to open door. Normal function will return after a complete cycle has been run.</li> </ul>
<b>Fault Indication will not go out</b>	<ul style="list-style-type: none"> <li>- Fault not Re-set. (Refer to list of Fault Codes)</li> </ul>	<ul style="list-style-type: none"> <li>- Fault not Re-set. (Refer to list of Fault Codes)</li> </ul>

**If in any doubt about any of the above procedures do not hesitate to call Priorclave Service on:**

**+44 (0)20 8316 6620**

**or your nearest Priorclave approved service agent**

## Appendix B - Steam Table

### Autoclaves

Temperature (°C)	Pressure (Bar)
100	0.00
105	0.20
110	0.43
115	0.69
120	0.99
121	1.06
122	1.13
124	1.25
126	1.35
128	1.55
130	1.70
132	1.86
134	2.04
136	2.21
138	2.40
140	2.60

### Steam Generators (where fitted)

Temperature (°C)	Pressure (Bar)
140	2.6
142	2.8
144	3.0
146	3.2
147.5	3.4
150	3.6
152	3.8
153.5	4.0
155	4.4

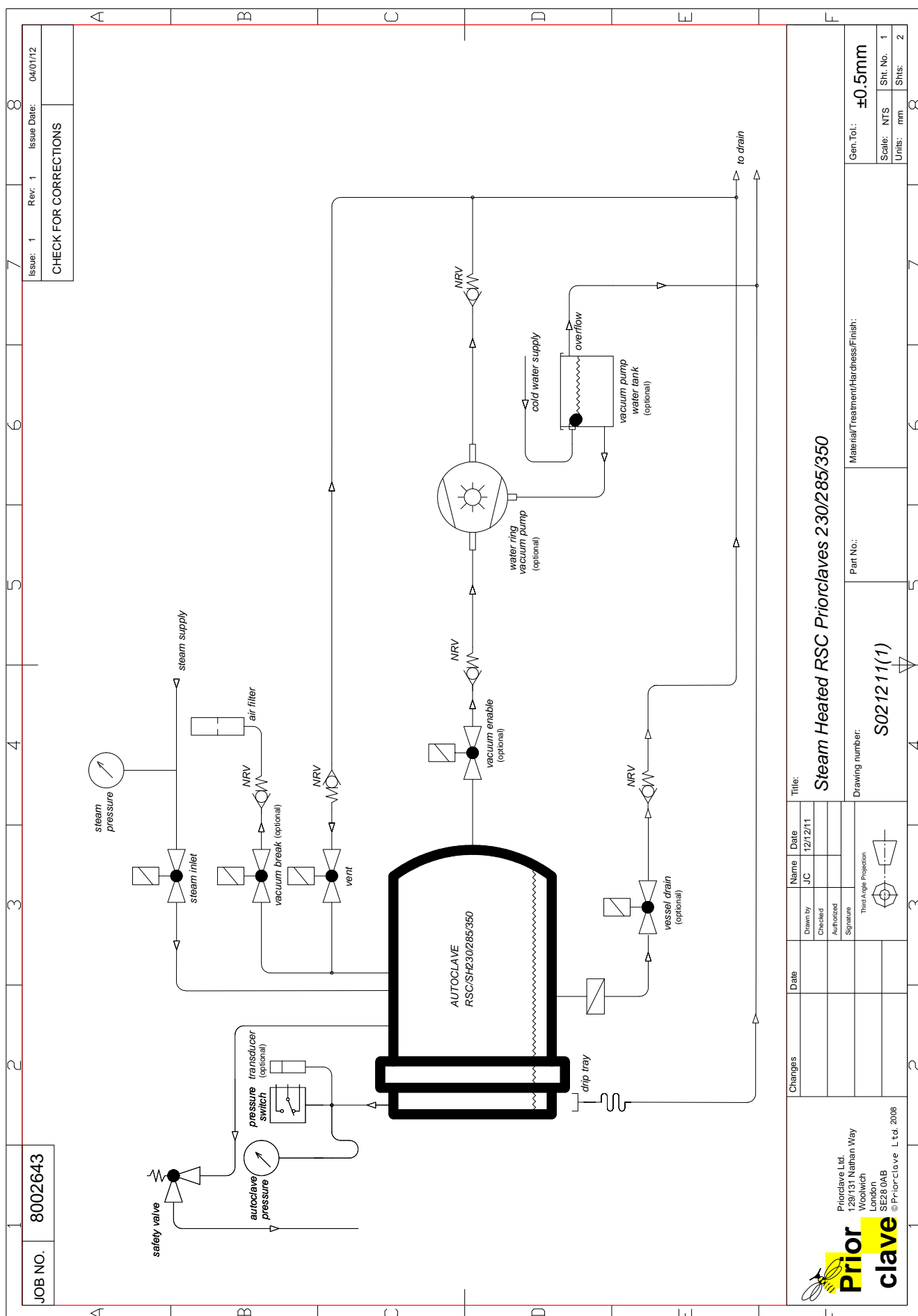
Correct Correlation between Temperature and Pressure shows correct operation of the autoclave and that air purging is satisfactory.



This table is accurate at sea level and at moderate altitudes will be sufficiently accurate for its intended purpose. However, at higher altitudes the pressures indicated will be slightly higher than those shown above.



## Appendix C – Pipework Schematics





## Appendix D - Wiring Diagrams

### Output Board Designations

#### *Output Board 1*

IN		OUT	FUNCTION
	1		
	2		
	3		
	4		

#### *Output Board 2*

IN		OUT	FUNCTION
	1		
	2		
	3		
	4		







## **Appendix E - Other Options Fitted**



# Extracts from Vacuum Pump Manual



## Liquid ring vacuum pumps

in compact design

**LEM 25, LEM 50**

**Pressure range: 33 to 1013 mbar Suction volume flow: 4 to 60 m<sup>3</sup>/h**

### CONSTRUCTION TYPE

SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation

- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere

- shaft not in contact with the medium
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts



### NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories). It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

### APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

### GENERAL TECHNICAL DATA

Pump type	unit	LEM 25	LEM 50
Speed 50 Hz 60 Hz	rpm	2800	
Max. compression over pressure	bar	3500	
Max. admissible pressure difference	bar	0.3	
Moment of inertial of the rotating pump parts and of the water filling	kg . m <sup>2</sup>	1.1	
Sound pressure level at a suction pressure of 80 mbar	dB (A)	0.003	0.0095
Max. gas temperature dry	°C	68	69
saturated	°C	200	
Service liquid		100	
max. admissible temperature	°C	80	
max. viscosity	mm <sup>2</sup> /s	4	
max. density	kg/m <sup>3</sup>	1200	
volume up to shaft level	liter	0.3	0.4
Max. flow resistance of the heat exchanger	bar	0.2	

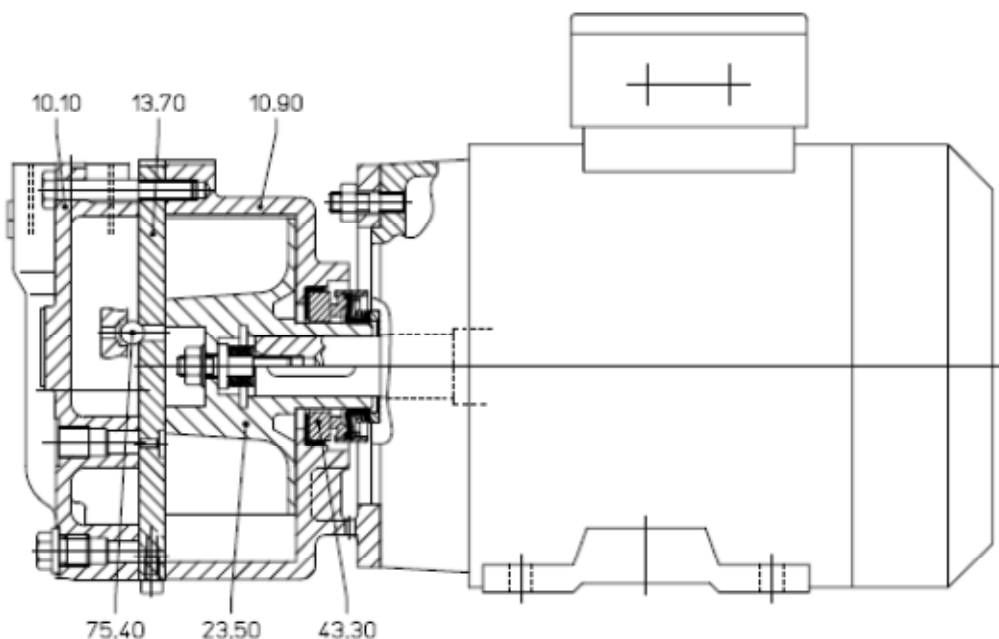
The combination of several limiting values is not admissible.

## Material design

Item	COMPONENTS	Material Design		
		0A	0R	4B *
10.10	Casing	0.6025		1.4408
10.90	Central body			
13.70	Guide disc		2.0596.02	
23.50	Vane wheel impeller	2.0970.02		1.4517
-	Steel parts in contact with the medium	1.4401		
43.30	Standard mechanical seal	Cr Ni Mo-steel / carbon / Perbunan		Cr Ni Mo-steel / carbon / Viton
75.40	Valve balls	polyamide A		PTFE

\* only for LEM 50

## Sectional drawing LEM 25, LEM 50



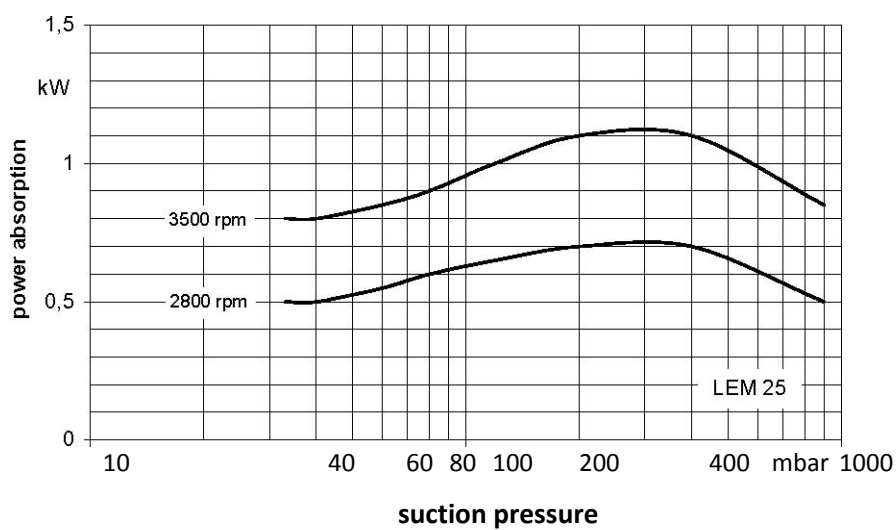
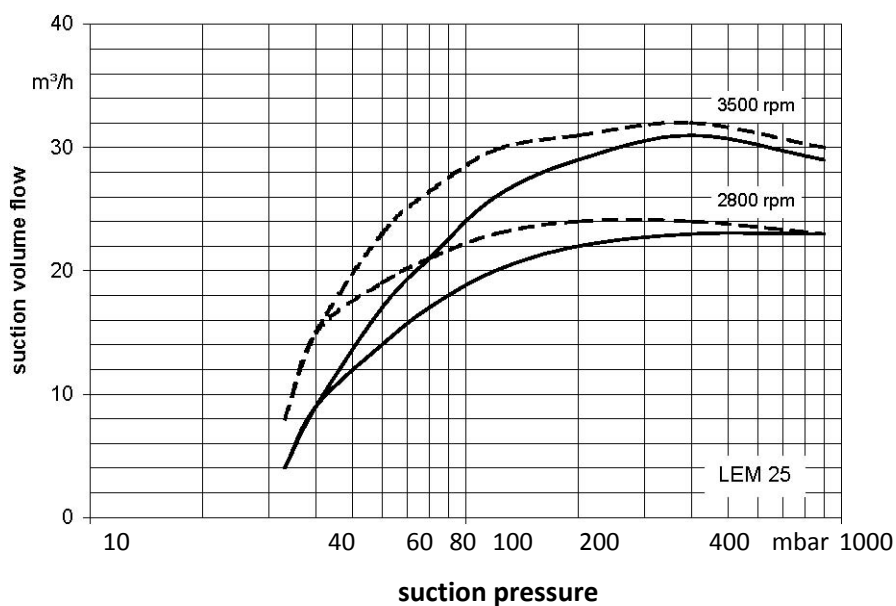
**Fresh water requirements** in [m<sup>3</sup>/h] in dependent on suction pressure, speed, mode of operation and difference in temperature suction pressure

Suction Pressure (mbar)		33				120				200				400					
pump	Speed (rpm)	KB			FB	KB			FB	KB			FB	KB			FB		
		Difference in temperature (°C)				Difference in temperature (°C)				Difference in temperature (°C)				Difference in temperature (°C)					
		10	5	2		10	5	2		10	5	2		10	5	2			
LEM 25	2800	0.04	0.06	0.12	0.26	0.05	0.08	0.13	0.26	0.05	0.08	0.14	0.26	0.05	0.08	0.12	0.2		
	3500	0.05	0.09	0.15		0.06	0.10	0.16		0.07	0.11	0.16		0.06	0.10	0.14			
LEM 50	2800	0.07	0.13	0.23	0.5	0.09	0.15	0.25	0.48	0.09	0.15	0.25	0.45	0.09	0.14	0.22	0.35		
	3500	0.11	0.18	0.29		0.12	0.20	0.31		0.13	0.20	0.30		0.12	0.18	0.25			

FB = fresh liquid service

KB = combined liquid service with service water 10 °C, 5 °C, 2 °C warmer than the fresh water.

## Suction volume flow and power absorption LEM 25



The operating data are applicable under the following conditions:

- pumping medium: - dry air: 20°C
- water vapour saturated air: 20°C
- 
- service liquid: -water: 15°C

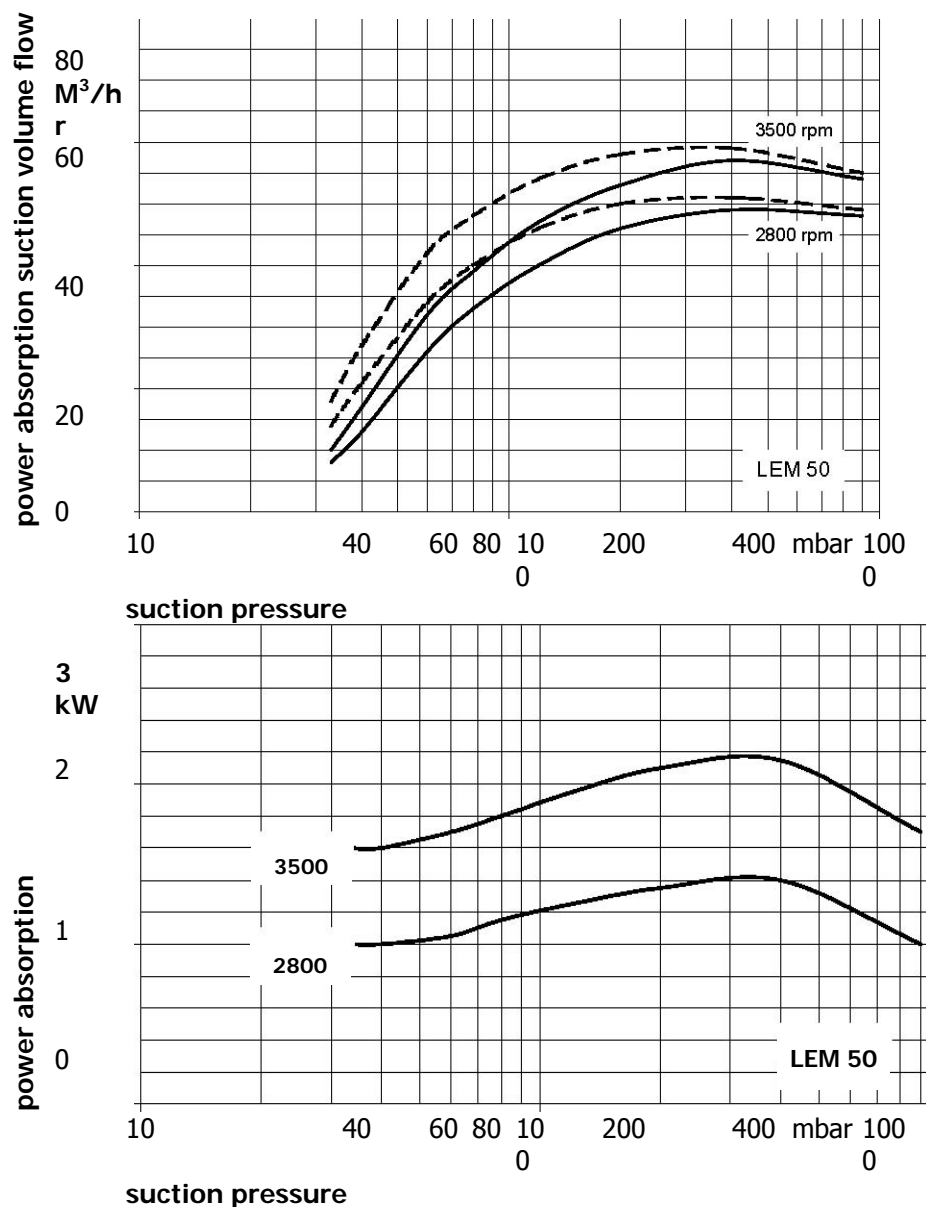
Compression pressure 1013 mbar (atmospheric pressure)

The suction volume flow is applied to the suction pressure

Tolerance of the operating data 10%

Max. fresh water need with lowest suction pressure

## Suction volume flow and power absorption LEM 50



The operating data are applicable under the following conditions:

- pumping medium:
  - dry air: 20°C \_\_\_\_\_
  - water vapour saturated air: 20°C \_\_\_\_\_
- service liquid:
  - water: 15°C \_\_\_\_\_

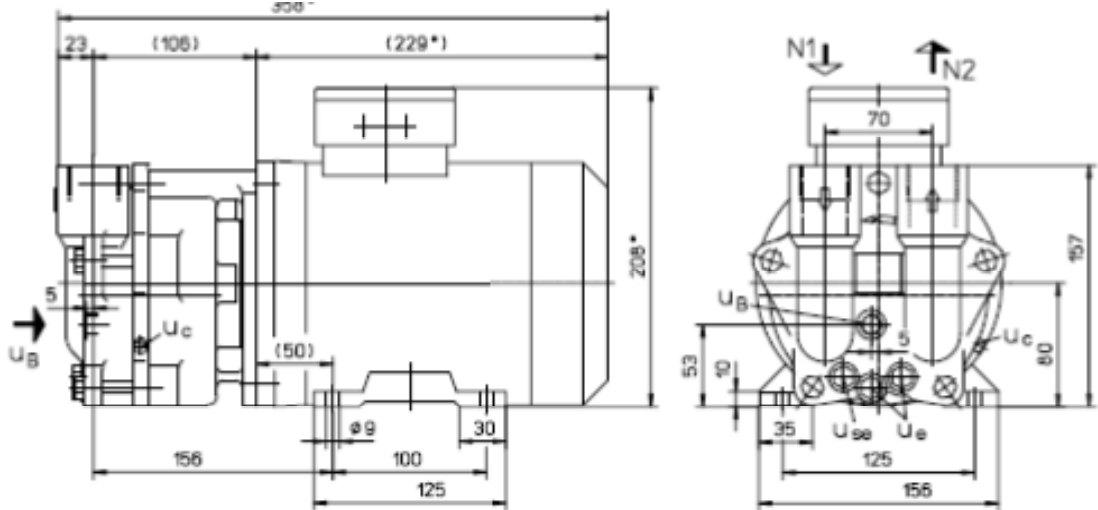
Compression pressure 1013 mbar (atmospheric pressure)

The suction volume flow is applied to the suction pressure

Tolerance of the operating data 10%

Max. fresh water need with lowest suction pressure

Dimension table LEM 25



electric motor IP 55				
	size	kW	approx. weight [kg]	
		50 Hz	60 Hz	
LEM 25	80	0.75	1.1	19

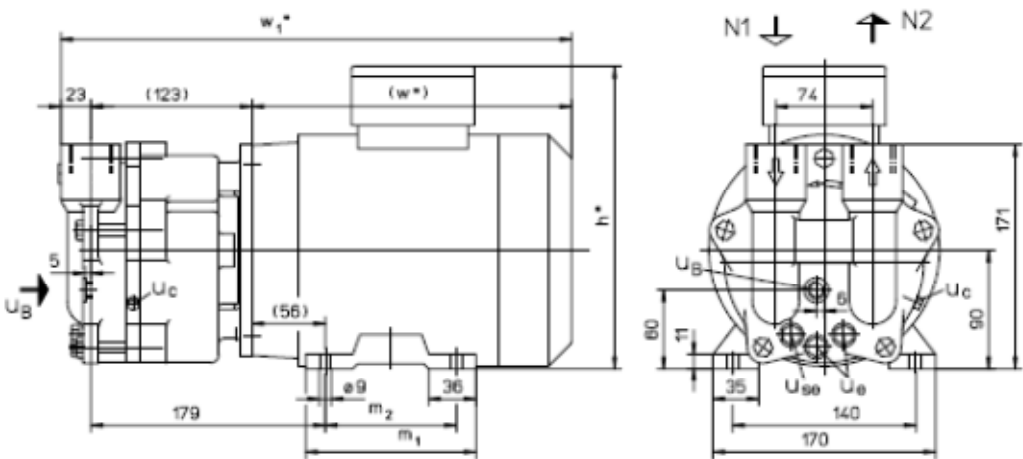
other motors on request

\* dimensions dependent upon motor supplier

N 1 = gas inlet G 1  
N 2 = gas outlet G 1

u B = connection for service liquid G ¼  
u c = connection for protection against cavitation M5  
u e = connection for drain G ¼  
u se = connection for dirt drain G ¼

Dimension table LEM 50



N 1 = gas inlet G 1  
N 2 = gas outlet G 1  
u B = connection for service liquid G ¼  
u c = connection for protection against cavitation M5  
u e = connection for drain G ¼  
u se = connection for dirt drain G ¼

	electric motor IP 55			H*	m <sub>1</sub>	m <sub>2</sub>	w*	w <sub>1</sub> *	approx. weight
	size	kW							
		50 Hz	60 Hz	(mm)	(mm)	(mm)	(mm)	(mm)	[kg]
	LEM 50	90 S	1.5	218	130	100	244	390	27
		90 L	-	230	155	125	255	401	30

other motors on request

\* dimensions dependent upon motor supplier

**Data regarding the pump size - order notes**

series + size	hydraulics + bearings	shaft sealing	material design	casing seal
	A• hydraulic A two grease •Z lubricated antifriction bearings arranged in the motor	X1L B90 mechanical seal carbon / Perbunan mechanical seal carbon / Viton	0A main parts of 0R 0.6025 similar to 4B 0A, but guide disc of non-ferrous metal main parts out of stainless steel	0 liquid seal
LEM 25	AZ	X1L	0A, 0R	0
LEM 50		X1L, B90	0A, 0R, 4B	

**Motor Selection**

For our products we offer a lot of different motor types. To identify the right motor please specify frequency, voltage and protection class.

**Example of an Order:** LEMA 25 AZ X1L 0A 0 with 0.75 kW AC motor, 50 Hz, 230V Δ, IP55

**Accessories LEM 25, LEM 50**

Recommended accessories		LEM 25	LEM 50
<b>Overhead liquid separator</b> material design steel, galvanized 1.4571 service liquid line material design steel 1.4571 cavitation protection line material design steel 1.4571	type weight SIHI part no.	XBa 244 2.8 kg 35 000 374 35 000 375	
	SIHI part no.	20 072 997 20 072 998	
	SIHI part no.	20 050 496 20 050 589	
SIHI-gas ejector material design Neonit / 1.4571 + brass Neonit / 1.4571	type SIHI part no.	GEV 25A 10 004 372 10 010 229	GEV 50A 10 004 373 10 010 230
Ball type non-return valve material design brass + Perbunan 1.4571 + Gafon	size / weight SIHI part no.	G1 / 0.7 kg 20 044 637 20 072 807	

Any changes in the interest of the technical development are reserved.

**Sterling SIHI GmbH**

Lindenstraße 170 , D-25524 Itzehoe, Germany , Telephone +49 (0) 48 21 / 7 71-01 , Fax +49 (0) 48 21 / 7 71-274

# Specification Sheet

## Attention!

Please read this manual before attempting to operate your Priorclave.  
Connection to the wrong power supply could lead to an expensive and unnecessary call out.

Model Number:

Working Capacity:

Heater Power:

Power Supply Required:

*Volts:*

*Hz:*

*Phase:*

Amps/Phase:

Steam Supply:

Dr

Options Fitted:

Accessories Supplied:



### Priorclave Service

129-131 Nathan Way  
West Thamesmead Business Park  
London SE28 0AB

Tel: 020 8316 6620

Fax: 020 8855 0616

E-Mail: [service@priorclave.co.uk](mailto:service@priorclave.co.uk)

Web: [www.priorclave.co.uk](http://www.priorclave.co.uk)



Form Specs sheet Issue 2 05/10/ aec



# Customer Warranty Registration

Please complete the details below and return by post or fax to the above address within 14 days of delivery of your Priorclave Laboratory Autoclave.

You will then be registered as a Priorclave user and your 12month\* Parts and labour warranty will commence from the date entered below.

## **Important**

If this form is not returned we can only commence your warranty period from the date of completion at our works.

**\* UK customers only. Outside the UK a full 12month warranty applies for parts only. Refer to your supplier for further details.**

**Priorclave**

**Model:**

-----

**Serial Number:**

-----

**Delivery Date:**

-----

**Company Name:**

-----

**Address:**

-----

-----

-----

-----

**Telephone:**

-----

**Fax:**

-----

**E-mail:**

-----

**Contact Name:**

-----

**Purchased**

**From:**

-----

**Delivery Date:**

-----

**Installation**

**Date:**

-----



## **Priorclave Service**

129-131 Nathan Way  
West Thamesmead Business Park  
London SE28 0AB

**Tel:** 020 8316 6620

**Fax:** 020 8855 0616

**E-Mail:** [service@priorclave.co.uk](mailto:service@priorclave.co.uk)

**Web:** [www.priorclave.co.uk](http://www.priorclave.co.uk)



