Priorclave

Operating Manual

Top Loading Compact Series
Priorclave Laboratory Autoclaves

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 and serviced your autoclave should give years of valuable and trouble free service.

Priorclave Service

Model No: ..... *

Serial Number: .....

NBBI No: .....

Date of Manufacture: .....

Software Version: .....

Please quote the above when asking for parts or service:

*** Model Numbers are in the formatted as PS/Mxx/znnn**

Mxx **MID** - Non – Vacuum models, **MVA** - Vacuum Models

z **V** for vertical, **H** for Horizontal, **C** indicating Compact model, either 40 litre horizontal or 60 litre vertical. (Horizontal 60 litre units have '**H**' in this position)

nnn Nominal working volume in Litres

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Website: www.priorclave.co.uk

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Notices and Important Information

Symbols used on the product and 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 this icon.

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 this icon.

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 this icon.

Caution: -Heavy

In this manual, cautions draw attention to the potential for injury to personnel where a product or item has a weight of over 18kg and reference should be made to your in-house procedures for heavy lifting before attempting to move or lift it. Each Caution Heavy Warning is emphasised by this icon.

Caution: -Please Note

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

Hazard - Isolate before Access

When one of these stickers 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 hazard. All such panels are service access panels only and should not be removed unless there is a full understanding of the equipment.

Electrical Hazard - Isolate before Access

When one of these stickers 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.

Electrical Earth Point

This protective label indicates a point at which an electrical earth cable should be connected. When removing and replacing panels after maintenance electrical earth cables **must** be reconnected at these points.

Mechanical Hazard

When one of these stickers 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.

Caution Hot Surface.

Parts of the surface to which one of these stickers are attached may become uncomfortably hot during the operation of the equipment. Take care if touching these surfaces without heat protection.

Refer to Manual

General Safety Instructions

All cleaning and servicing requires the autoclave to be isolated from the power source and disconnected.

This equipment weighs in excess of 18 kg (40 Ibs) and requires at least 2 persons to lift.

Should a fault occur with the autoclave, immediately isolate and disconnect the incoming power.

When the autoclave is being transported it should be sat firmly on its feet. The machine should be strapped upright to a flat pallet during transport.

When the machine is not in use, where possible it should be disconnected from the electrical supply and water supply.

Ensure the equipment is installed, operated and maintained by trained and authorised personnel.

Always isolate the autoclave before cleaning or maintenance

Always ensure the machine is level when in use.

If fitted, in the event of an emergency press the red «E» stop button situated on the front of the autoclave.

The autoclave should be used as provided and should not be tampered with or altered as the machine contains inbuilt safety systems, which could be compromised by any interference.

During operation some autoclave surfaces may become uncomfortably hot. Take care if touching these surfaces without thermal protection.

Care should be taken when opening the autoclave after a sterilising cycle as it will be hot and steam may be released. Heatproof gloves and a face shield should always be worn when unloading autoclaves.

When operating the autoclave contains steam at elevated temperature and pressure. Always take care when operating autoclaves.

The autoclave should only be used for its intended purpose. You must consult the manufacturer or supplier before using the autoclave for anything other than its intended purpose.

Specification Table

Model:		PS/MID/C60	PS/MVA/C60
Intended use.		**Principle uses:** Preparation of Laboratory growth media and sterilisation of laboratory waste prior to disposal. **Additional uses:*** sterilisation of bottled liquids and glassware, sterilisation of unwrapped instruments and porous loads. * dependent upon options fitted #	
		This equipment has not been designed for or intended for use as a medical steriliser.	
Capacity (L)		60	60
Dimensions	External (mm) (wxdxh)	502x620x900	707x620x900
Weight kg (Approx.)	Unloaded	100	110
	With water charge	110	120
	Door	20	20
	Pressure Vessel	15	15
Electrical	Voltage (V)	230	
	Frequency (Hz)	50/60	
	Phases	Single Phase with earth	
	Max. Current Rating (A)	13	
	with Drying# (A)	13	
	Heater power kW	2.9	
Steam	Steam Supply Required	Not Applicable	
Water	**Softened** Water Supply Required	Hand Fill	
	With Auto-waterfill:	15mm BSP	
Drainage	Main Drain Connection	15mm BSP	
	Secondary Drain Connections (where Applicable)	15mm BSP	
Max. Sound Level	Without Vacuum Pump	Approx. 30db @ 1M	
	With Vacuum Pump	Approx. 65db @ 1M	
Max. Heat Emission	Full Cycle - to thermal lock temperature*	((2.9h 1.45p)x0.75)/t) kW/Hour Where: h = heat-up time (hrs) p = process time (hrs) t = Total cycle* (hrs)	

Must be fitted with option PC/MID/VDY. Please refer to your order paper work or the specification sheet enclosed with this manual

Important Notices and Warnings

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 to arrange 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 PD5500 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 calculations from PD5500, and assuming working at the maximum working pressure of 2.4 bar this gives the autoclave vessel a projected fatigue life of 15,000 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 20.5 to 10.2 years respectively. Your own usage of the autoclave should be considered to determine the actual lifespan of the autoclave.

Cleaning

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

Water Supply and Quality

This autoclave has been designed to operate most effectively with softened water.

Unless this autoclave has been specifically adapted for purified water supplies * then demineralised, distilled or RO water supplies **MUST NOT** be used as the controls fitted rely on electrical conductivity to detect water levels.

Connection to a hard water supply can lead to a build-up of scale and will damage the heaters and other parts of the system and could invalidate the warranty.

RO and Ultra-Pure water can also damage some elements of the steam generation system unless the autoclave has been specified and modified to operate with water of this quality*.

The usual method of filling is by hand.

* Please refer to the specification sheet included with this manual for details.

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.

If your autoclave is run at an average frequency of more that 3 times per week then we strongly recommend that it should be serviced every six months, even during its initial 12 month manufacturer's warranty in order to maintain it in peak operating condition. Autoclaves used less frequently can be serviced at 12 month intervals.

Service contracts for preventative routine maintenance can be arranged with Priorclave Service (service@priorclave.co.uk) or with your Priorclave authorised service agent.

Priorclave Ltd. cannot be held responsible for hazards or damage resulting from work carried out on the pressure system including its closure components by untrained or unauthorised personnel. If in doubt please contact Priorclave Service (service@priorclave.co.uk) or your nearest authorised service agent.

Faults caused by servicing by unauthorised service agents will not be covered by any warranty supplied with the autoclave.

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

Electromagnetic Compatibility. Generic Emission Standard. Residential, Commercial & Light Industry.

BSEN61000-6-1

Electromagnetic Compatibility. Generic Immunity Standard. Residential, Commercial & Light Industry.

BSEN61010-1

Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory use.

BSEN61010-2-040

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

Unfired fusion welded pressure vessels

BS2646 1996

Autoclaves for sterilisation in laboratories

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 (~ 6500 feet).

  At this altitude the standard safety valve set at sea level will limit the upper temperature to around 136°C. Adjustments can be made to compensate for this if required. See Appendix B - Steam Table for special conditions affecting calibration for operation at elevated altitudes.
- Operating temperatures between 15°C and 27°C. - 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 15°C and 27°C, Non Condensing.
- Mains Supply Voltage Variations not exceeding $^{+}/_{-}$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 positioning the equipment however, to avoid interference from potential extreme sources of interference such as MR scanners or x-ray equipment.

Quick Opening Doors

Extracts from **NONMANDATORY APPENDIX FF (GUIDE FOR THE DESIGN AND OPERATION OF QUICK-ACTUATING (QUICK-OPENING) CLOSURES)** from ASME **SECTION VIII DIVISION 1**

FF-6 INSPECTION

II is recommended that the user inspect the completed Installation Including the pressure gauges before it is permitted to operate. Records of this inspection should be retained.

It is recommended that the user establishes, and documents a periodic in-service inspection program, and that, this program is followed and documented.

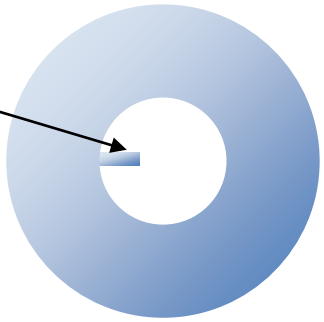
FF-7 TRAINING

Many accidents involving quick-actuating closures have occurred because the operators have been unfamiliar with the equipment or its safety features. The greater safety inherent in current designs has sometimes been produced by the use of sophisticated mechanical, electrical and electronic control devices. To ensure these features produce the maximum safety, personnel should be properly trained in their operation and maintenance.

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.

1. Check electricity supply is **ON**, and that the power is switched **on at the wall socket**.
2. Press the '**Door**' button on the control panel there will be a bleep and the message '**Hold**' will be displayed in the temperature display. Wait for a short time until the temperature 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.
3. Move the locking handle to the right until it reaches its safety stop. Do not lift handle until the lock has withdrawn as this may lead to damage.
4. Release the safety catch by pushing it down with your thumb and move the locking handle to the end of its travel. The door can now be opened.
5. Top up with water if necessary until the water level touches the bottom of the tag in the centre of the load support plate in the bottom of the autoclave.



ALWAYS CHECK THE WATER LEVEL BEFORE STARTING A CYCLE

6. Load the autoclave.
7. Set the temperature as required using the up/down keys.
8. Set the process time as required using the up/down keys.
9. Set / select other functions i.e. free-steam, rapid cooling etc., as required and if fitted.
10. Carefully close the door with the locking handle fully to the right.
11. Move the locking handle to the left in one action to lock the door.
12. 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

Aborting a cycle

To abort the cycle at any stage press the '**Start**' Button

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 hold it there.

Press the '**Door**' button once, keeping the thermal lock key held over.

Wait during the **'Hold'** display until there is a bleep and the '**Door**' indicator illuminates.

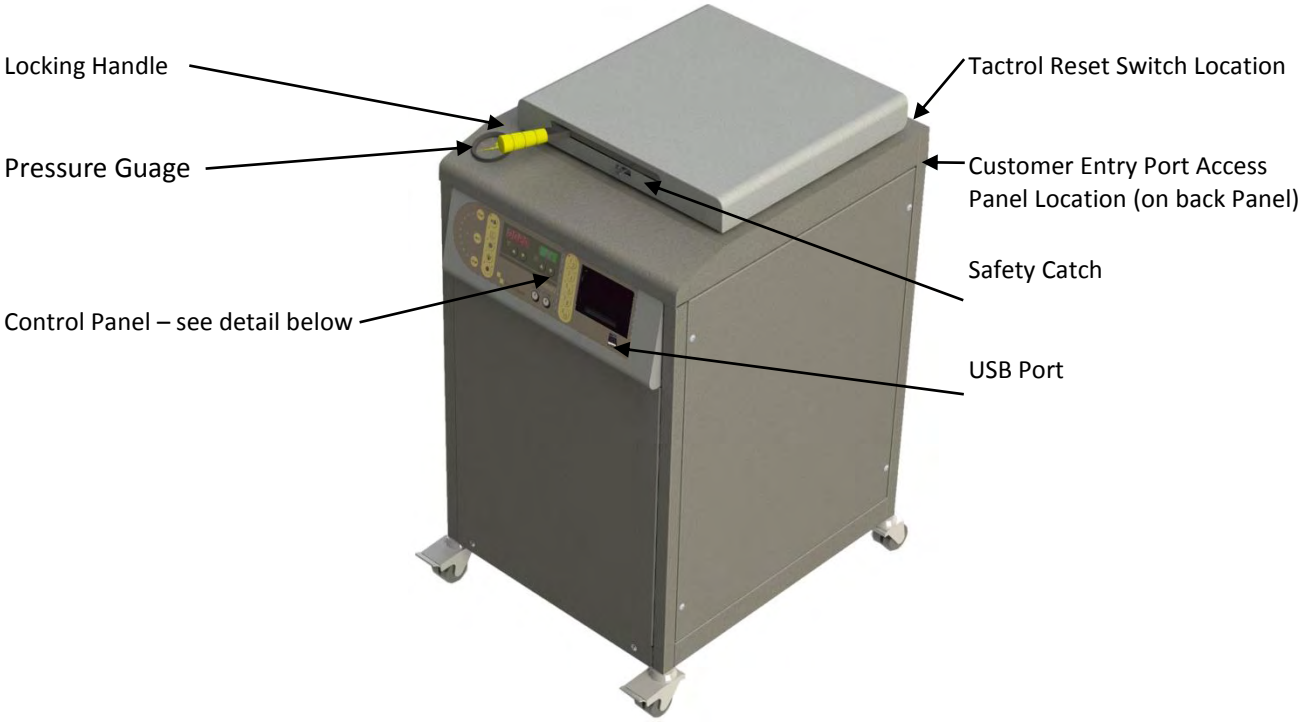
Keep the key held and press the '**Door**' button once to unlock the door.

The key-switch can now be released and the door opened as above.

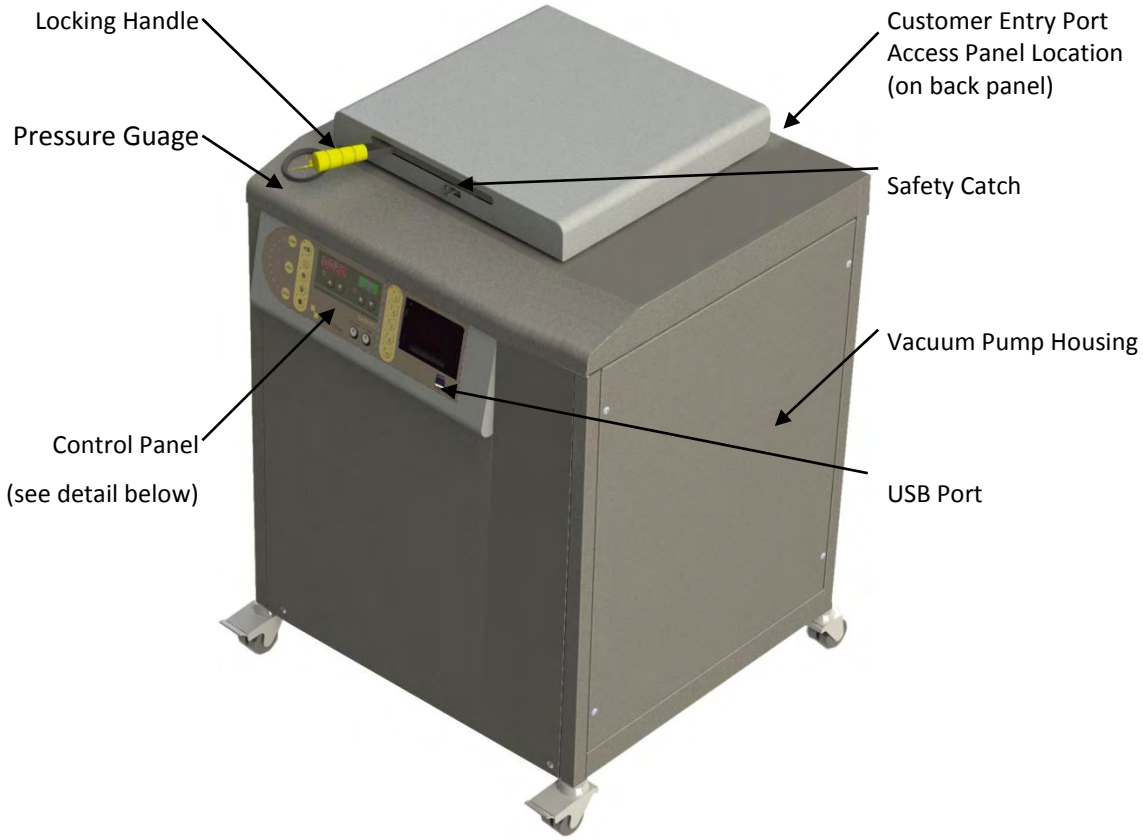
If the key is released at any stage the procedure must be repeated to open the door and reset the display.

Layout Diagram

Non Vacuum Models



Vacuum Models



Layout Diagram

Control Panel Details

1	Door Button & Indicator	**7**	Time Display & Setting Buttons
2	Cycle Progress Display	**8**	Program Buttons & Indicators (Optional)
3	Vent Button & Indicator	**9**	Printer (Optional)
4	Start Button & Indicator	**10**	Setting Lock Key switch (Optional)
5	Option Setting Buttons & Indicators	**11**	Thermal Lock Key switch
6	Temperature Display & Setting Buttons	**12**	Hidden 'till lit fault display

Operation

Before using your Priorclave for the first time check that the electrical supply is switched on, that the water supply (if required) is available and turned on and that the Emergency Stop Button (if fitted) is not pushed in.

Before proceeding please check the specification sheet supplied with 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 Door

1. Switch on the power at the wall socket. All indicators will light momentarily and a sounder will bleep. This is to enable the indicators to be checked.

If you are powering up the autoclave for the first time, or if the autoclave is fitted with conductivity water detection and is in a low water condition the error code **F004** will be showing in the temperature display. You may ignore this at this stage as opening the autoclave and filling it with water will reset this error code.

2. The **start** and/or **low water** indicators should now be lit. Check that the pressure gauge is reading zero and then press and release the **door** button, which will bleep, and wait for a short time (about 20 seconds) until the **door** indicator illuminates and the sounder bleeps again.
3. During the waiting time the temperature display will show **Hold,** confirming that the autoclave is waiting during its safety delay.
4. On pressing the door button a second time, you may hear the locking solenoid operate. You may now move the locking handle to the safety catch position. (The vent button will light when the door button is pressed and remain lit after the handle is moved)

Do not attempt to open the door before the lock has released or damage to the locking mechanism may result which will not be covered by the warranty.

5. The door is retained by the safety catch. In the unlikely event of undetected residual pressure being present the safety catch prevents the door from being blown open by breaking the gasket seal whilst retaining the door, thus allowing the pressure to escape safely from around the edge of the door.
6. The safety catch is released by pushing it down with your thumb and then moving the locking handle to its fully open position. The door can be now be pulled open gently.

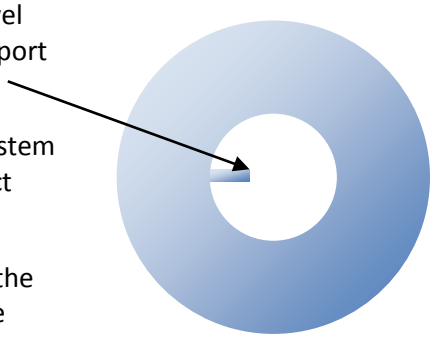
Care should be taken when opening the door as it will be hot and steam may be released. Heatproof gloves and a face shield should always be worn when unloading autoclaves.

Checking Water Level.

ALWAYS CHECK THE WATER LEVEL BEFORE STARTING A CYCLE

The autoclave uses an immersion heater in a reservoir of water at the bottom of the autoclave chamber to raise steam. The heater is protected from boiling dry by a low water cut-out.

The reservoir should be filled with water until the water level touches the bottom of the tag in the centre of the load support plate in the bottom of the autoclave.



If your autoclave is fitted with an automatic water-filling system then the autoclave will begin to fill with water to the correct water level as soon as the door is opened.

Protection against the autoclave boiling dry and damaging the heating elements in the event of low water in the autoclave vessel is provided by one of two methods.

If your autoclave is fitted with an automatic water-filling system then the autoclave will begin to fill with water to the correct water level as soon as the door is opened.

Protection against the autoclave boiling dry and damaging the heating element in the event of low water in the autoclave vessel is provided by a conductivity detection system.

This system is ideally suited for use with softened water.

It uses a water conductivity probe (or 2 in the case of the filling system) which detects water level using the conductivity of the water.

If the water level falls below the sensor the autoclave shuts down, the **low water** warning is lit and fault code **F004** is shown in the temperature display.

In hard water areas softened water must be used to prevent scale from forming in the autoclave. If manually filled then distilled water can be used but when the autoclave is new, some tap water may need to be added until the **low water** lamp is extinguished as the low water cut out is operated by the water's conductivity. A visual check of the water level is always recommended before commencing a cycle.

Great care should be taken to ensure that the un-insulated part of the low water sensor is clean as a build-up of contamination here will prevent the low water cut-out from working and could lead to heater damage.

Heater Protection with low conductivity water (if specified)

A temperature sensor attached to the heater in the autoclave chamber is connected to the Tactrol controller. The overheat temperature is factory set.

If an over-temperature is detected from the sensor then power to the heating circuit will be switched off and fault code F018 will be shown in the temperature display.

Should this occur, then the autoclave should be switched off and allowed to cool to a safe temperature and pressure before opening for examination of the water level.

The **F018 or F004** indication must be **manually re-set** when the door is opened by turning the program setting lock key-switch from position 1 to 3 and back again or if a programmer is not fitted by pressing the **Tactrol Re-set** switch at the back of the autoclave. However, the autoclave should be checked by an engineer for faults as soon as possible and cleaned or repaired as necessary before re-use.

A final level of temperature protection is provided by a non-resettable thermal fuse in-line with the heater.

Loading

The autoclave can now be loaded with the items to be sterilised in baskets, or in the case of waste loads which may leak liquids when autoclaved, watertight discard containers

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.

For waste loads, which may leak liquids when autoclaved, watertight discard containers are strongly recommended.

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.

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** to allow the parameters to be altered.

Sterilising Temperature & Time Settings.

Research carried out by the UK 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 the description later in 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, which can assist greatly with reducing the temperature lag.

This can be achieved by pressing in the **vent** button manually and releasing it manually. Alternatively, the **Automatic Free-steaming** function will perform this function automatically if the option is selected.

If you have an interest in any of the options mentioned above, which can quite easily be retro-fitted, please contact Priorclave North America.

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

More precise settings can be assessed by carrying out a 'worst load' test. (See commissioning).

Setting the process time

The process timer can be set to a time up to 999 minutes. The time required is set by simply using the time up/down buttons. 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 Timed Free-steaming, Cooling, Media Warming Option, and optional functions such as Load Sensed Process Timing and vacuum cycles, 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 an option is not fitted (or permitted in the selected program in multi-program memory models) pressing the appropriate key will result in a visual and audible fault being signalled and the function will not be selected.

Automatic Timed Free-Steaming

What is free-steaming?

Incorporating a period of free-steaming 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. Free-steaming 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 free-steam time.

If free-steaming is required this is selected by pressing the **Free-Steam** button . The indicator lights up to show that Free-Steaming is selected. The time display will now flash indicating that the Free-Steam time, not the process time, is currently being displayed. The Free-Steam 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 Free-Steam time or make further changes then free-steaming should be deselected, then reselected.

Caution should be used before setting a Free-Steam time longer than 15 minutes. Excessive free-steaming times can use a large amount of water, increasing the possibility of the cycle not completing due to a Low Water condition.

Free-Steam temperature setting

Timed free-steaming will commence at a temperature slightly above 100°C, which has been set at the time of manufacture. If required, this temperature may be increased by qualified personnel 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 the Installation manual for this model), as the release of pressurised steam into the laboratory should be avoided.

Performance can be improved even further by fitting the optional pulsed Free-steaming system.

Pulsed Free-Steaming

(Optional Function – included for autoclaves with vacuum cycles)

With certain loads and in certain situations the efficiency of the free-steaming process can be improved by pulsing. When available according to program then free-steaming commences as described above but at a higher temperature. Instead of remaining open for the entire free-steaming period the vent valve shuts off at a lower temperature. 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 free-steaming. This continual pulsing of steam out of the autoclave creates considerable turbulence within the autoclave, helping to draw trapped air out of the load.

If fitted, this function is program specific and is usually set up during commissioning or by request on particular programs in response to customer requests at the time of ordering.

When selected as part of the program the pulsing function replaces the standard free-steam function described above.

Setting of the free-steam time for a particular program is as described above.

Pulsed free-steaming is not suitable for bottled liquids and should not be selected for cycles intended for these types of load.

Load Sensed Process Timing

(Optional Function)

Load Sensed Process Timing Function

If this option is fitted, the autoclave will be provided with an additional temperature probe inside the autoclave chamber. This probe 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 temperature probe, reaches a temperature just below the set chamber temperature. The cycle will then proceed in the usual manner.

Load Sensed Process Timing 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.

Positioning Load Sense Probe

The probe should be positioned in what is anticipated to be the slowest part of the load to heat up, 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.

Temperature variations can be reduced by the use of timed free steaming.

Load Sense Temperature Probes

The load sensed process timing option utilises a temperature probe connected directly to the main processor board.

Replacement temperature probes are available from Priorclave.

Rapid Cooling

A fan is fitted into the bodywork of the autoclave to direct cool air over the autoclave vessel.

If selected by using the **cooling** button, the cooling 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.

Immediate start - The cooling fan does not operate at all during the cycle.
Left hand indicator lit. - 1 press of the **cooling** button.
The cooling fan starts as soon as the cooling stage is reached.

Delayed start - Both indicators lit- 2 presses of the **cooling** button.
The cooling fan starts after the autoclave chamber has cooled to 100°C. This setting is useful when autoclaving some fluid loads, as bringing the cooling fan 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.

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, especially when used along with **the delayed start function**.

Delayed Start Time

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

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 **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 +	Enter required Start time hour (24 hour clock)
	2	0-59	Delayed Start time Minute +	Enter required Start time minute
	3	0/1	Start Delay Select On/Off +	0= OFF 1= ON

+ The time is set in real time, therefore the clock has to be correctly set for this to work properly.

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

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

Vacuum Options (MVA (vacuum) models only)

(Optional item)

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 (Pre-Cycle Vacuum can be selected)
Program 2: Pre-Cycle Vacuum and Vacuum Cooling
Program 3: Pre-Cycle Vacuum and Vacuum Cooling
Program 4: Non vacuum Cycle (Pre-Cycle Vacuum can be selected)
Program 5: Non vacuum Cycle (Pre-Cycle Vacuum can be selected)

Pre-Cycle Vacuum

The pre-cycle vacuum is selected using the function select key on the control panel. With the left-hand 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. By default two vacuum stages will be performed, with a heating stage in between. Pre cycle vacuum is essential when autoclaving loads containing densely packed porous material.

Vacuum Cooling - Suitable for Non Liquid Loads Only

A vacuum cooling cycle can be selected by means of the function select key. With the option selected the right-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 autoclave vent is opened and the autoclave cools to a pre-set temperature with the air-cooling fan(s) operating. When the pre-set temperature is reached the cooling fan(s) continue 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 boil over, contaminating the inside of the autoclave chamber. Sealed containers of liquid are likely to explode. Unexploded containers will be in a dangerously unstable condition when removed.

Drying Cycle - Suitable for Non Liquid Loads Only (Optional Vacuum Options Fitting)

This option must be selected for attachment to a particular program in the control software during commissioning.

A drying cycle can be selected by means of the function select key within a program pre-designated as a drying program. With the option selected the right-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 a partial vacuum is drawn and heaters attached to the outside of the autoclave 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 boil over, contaminating the inside of the autoclave chamber. Sealed containers of liquid are likely to explode. Unexploded containers will be in a dangerously unstable condition when removed.

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 key switch 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.

NOTE: 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.

Closing the pressure door

When you have set up the cycle parameters close the door with the locking handle in the fully raised position. Then, in a single action push the handle down into the locked position. The door will now be properly secured.

Starting a cycle

Ensure the door is properly secured and the **start** indicator is illuminated. To start the cycle press the **start** button.

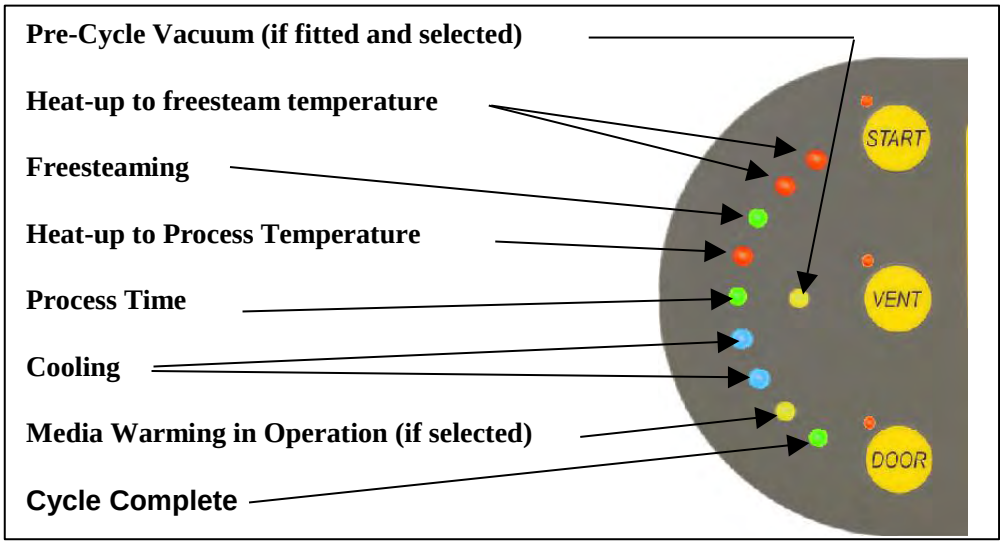
The first segment of the cycle status indicator bar will illuminate and the autoclave will now gradually heat up to process temperature. The cycle status indicator will also advance through its stages to give 'at a glance' indication of the cycle's progress.

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.

Pressing the Free-Steam Button during the Free-Steam part of the cycle will give an indication of Free-Steam time remaining as a flashing display in the timer window.

On Priorclaves not fitted with the setting lock key-switch 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.

When the autoclave has reached its operating temperature the door cover and other nearby surfaces may become uncomfortably hot. Take care if touching these surfaces without heat protection.



Vent button.

The **vent** button may be used at any stage during the cycle. When used it opens a solenoid 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 Free-Steaming** has not been selected. Care should be taken with this manual method however as failing to switch the **vent** off will waste a large amount of steam and to eventual cycle failure. 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.

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.

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.

If for any reason the temperature is forced outside 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 key switch is fitted:

pressing the reset button on the top panel on the right hand side of the autoclave control box,

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.

Power loss during a running cycle.

Loss of power to the autoclave whilst the cycle is running can have one of two outcomes, depending on the stage of the cycle at which the power loss occurs:

If the power loss occurs at any point **before** completion of the sterilsing stage of the cycle (process time) then the error code **F006** will be shown in the temperature indicator and the cycle will be stopped. 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 as described above.

If the power loss occurs **after** completion of the sterilsing stage of the cycle (process time) then the cycle will stop but error code **F006** is **not** shown in the temperature indicator. If the autoclave was cooling or running a post-cycle vacuum process at the point of power loss then this will **NOT** resume after the power loss.

In many cases and with many loads this distinction between the stage at which power failure occurs can be helpful as it allows operators to determine whether the load is safe to use or dispose of rather than having to be run through the autoclave again.

Cooling

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 blue. If **Cooling** has been selected this will be switched on automatically according to the cooling strategy selected. Otherwise cooling will be by convection.

If there is a power fail while the autoclave is in the cooling part of the process the cycle will resume in the cooling phase once power is restored.

If the power should fail before sterilisation is complete then the cycle will be stopped.

Thermal lock

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 and glassware could be damaged.

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 responsible personnel should keep the Thermal Lock Override key in a safe place away from the autoclave and prevent access to it by unauthorised personnel.

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

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

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.

Opening the autoclave to unload and re-load for the next cycle is simply a repetition of steps 1 & 2.

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.

Emergency «E»Stop Button (if fitted)

In an emergency, pushing in the emergency stop button will cut the electricity supply to the heaters and control system.

After use this must be released using the key provided.

This key should be kept by responsible personnel in a safe place away from the autoclave and access to it by unauthorised personnel should be prevented.

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.

Setting Lock Key-switch Option

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

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 (in the format **dd/mm/yy**)
CYCLE NUMBER
PROGRAM NUMBER (if multi-program memory option fitted)
TEMPERATURE AND TIME AT CYCLE START (time is initially 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

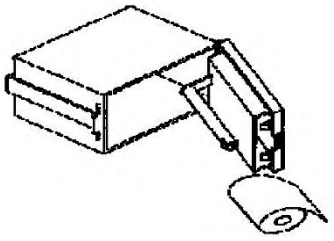
(Fail means that a fault signal has occurred during the cycle or that the cycle was aborted. See - Warning Indicators)

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.

Replacing Paper Roll



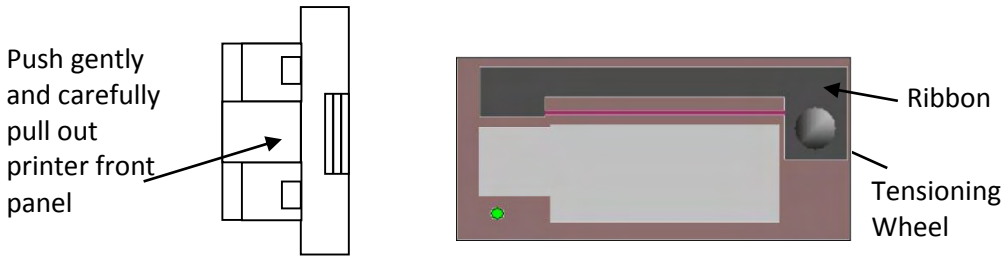
Correct Paper Path

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.

Always use the correct paper. Suitable paper is available from Priorclave Service or your local distributor.

Changing Printer Ribbon



Ribbon fitting detail

With the door of the printer open gently push the printer door at the point shown in the diagram. The outer door cover should come away exposing the print ribbon mounting plate as shown above.

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.

Serial Interface

The autoclave is supplied with an externally mounted serial connector and a suitable connecting cable for serial or USB connection to a computer. Also supplied is a website address from which to download the latest software and a full operation manual for the system.

USB Interface

The autoclave is supplied with an externally mounted USB port. Also supplied is a website address from which to download the latest software and a full operation manual for the system.

Automatic Waterfill Option

(Not suitable for RO, or Purified water supplies)

This option consists of a water tank mounted inside the side extension of the autoclave, a conductivity water level probe set to detect minimum water level and a second conductivity water level probe set to detect water level at the optimum fill level for the autoclave chamber.

The water tank is fitted with a float valve to automatically control fill level.

Whilst the autoclave door is open during loading and unloading a valve is opened and water flows into the autoclave vessel from the water tank until the upper water level probe is reached.

This system is additionally fitted with a timer that automatically shuts off the water supply after a pre-set time. This is fitted as a measure to prevent flooding in case of a failure of the water level probe.

If the timer times out before the water level reaches the probe then Fault **F016** will be displayed.

To start filling again reset the fault (see Warning Indicators and Fault Codes). The water level probe should be regularly checked and cleaned (see Maintenance Section for details)

During normal operation only small amounts of water will need to be replaced, however when first filling the autoclave or whilst filling after cleaning, more time will be required.

Air Intake Filter

(Optional or fitted as part of a vacuum drying system)

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.

The filter should be regularly changed to maintain its effectiveness

Vent Filter Option

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 manufacturer's instructions enclosed with this manual.

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.)

Accelerated media cooling

Unless specified otherwise before delivery of the autoclave or set up during the commissioning process the Media cooling function is set to operate by default with **program 1**.

It can easily be re-set to operate on different programs by a Priorclave Engineer or your local approved Priorclave representative.

When selected the autoclave will carry out a standard media cycle and will begin cooling as normal with the cooling fan coming on at the end of the process time.

As the autoclave cools below 100°C the pressure on the gauge will gradually drop below 0 and into a vacuum. This assists greatly in the cooling of liquid loads giving savings of around 50% of the total cooling time to cycle completion at a safe thermal lock temperature.

Once the cycle has completed any vacuum in the autoclave is automatically released and the door can be opened in the normal way.

For best results over sized bottles should be used, i.e. 500ml volumes in a 1000ml bottle.

Delayed start cooling (both lights lit on the cooling button) may be required if excessive media volume losses during cooling are observed.

Chart Recorder / Data Recorder / Data Logger

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 temperature probe, and in the case of two channel units the second channel records the temperature of the load probe.

For more details on individual recorder function and operation please refer to the recorder or logger manufacturer's manual supplied with the autoclave.

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 **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
		The autoclave can be set for the cycle to start after a pre-programmed delay, for example to allow a media preparation cycle to complete shortly prior to the start of the working day. Setting the value of parameter 1 to 1 in the time display switches delayed start on.		
	1	0-24	Delayed Start Time Hour +	Enter required Start time hour (24 hour clock)
	2	0-59	Delayed Start time Minute +	Enter required Start time minute
	3	0/1	Start Delay Select On/Off +	1= ON 0= OFF
*	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.
			Scroll back up to parameter 1 to confirm the new or current time settings.	
#	11	1-999	Cycle Repeats	Enter Number of Cycles Required

+	The time is set in real time, therefore the clock has to be correctly set for this to work properly. After one delayed start operation, delayed start automatically switches off, and the autoclave returns to normal operation.
#	**Models fitted with optional Cycle Repeat Facility only**
*	**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

If one of these faults occurs please contact your service provider with details of the fault and the serial number of your autoclave

Do not attempt to rectify these faults (with the exception of the Service indicator and the low water fault) yourself.

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 temperature sensor 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 temperature sensor.

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 Free-Steam - During Pulsed Free-steaming 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.

F018 Heater Overheat. If this fault occurs then the most likely cause is a Low Water condition. Check the water supply is turned on and the condition of the heater before resetting this fault.

LOCK

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

LOAD + FAULT CODE F001

This warning is activated in the event of the failure of the load sensing temperature sensor. The temperature sensor 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.

Routine Operator 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 attempt to carry out any work unless you are competent to do so.

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

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

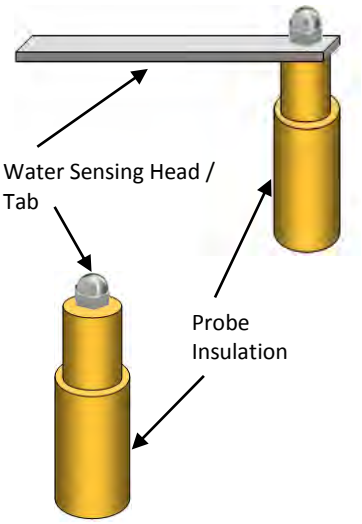
In the event of any difficulty or doubt about any maintenance or service procedure contact Priorclave Limited or your nearest Priorclave approved agent or supplier immediately.

For full maintenance and servicing details please refer to the Maintenance Manual

Daily Maintenance

LOW and FILL Level Water Level Probes (where fitted)

To ensure protection from boiling dry, the insulated section of the low water probe between the stainless steel tip and the pressure vessel wall should be scrubbed clean to prevent it from being short circuited (see diagram). The sensor tip should also be kept clean to ensure good contact.



Water Level and Condition

The standing water within the vessel should be regularly removed, ideally with a wet/dry type vacuum cleaner to prevent the build up of *spilled media* and *potentially corrosive chemicals*. With the vessel emptied of water, the heating element(s) should be wiped with a damp cloth to remove any build-up of Limescale.

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.

Weekly Maintenance

(To be carried out in addition to daily maintenance program.)

Autoclave Cleanliness

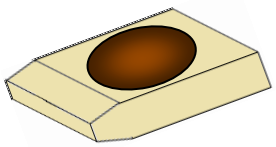
Check exterior of machine and the inside walls of the pressure vessel for general cleanliness, particularly around operating parts and external switches and pins. Use anti-bacterial wipes to clean exterior panelling.

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).

Door Gasket (s)

To prolong the life of the sealing gaskets 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. Silicone grease such as high vacuum grease is ideal for this purpose. Ensure that the grease is lightly spread evenly around the surface of the gasket.

Door Closure Arms



To ensure a free action of the Closure Arms, they should be kept lubricated and free from dirt. The mating face of the Arm should be lightly coated with Copper Grease to ensure a smooth action.

Drainage

If the autoclave has been plumbed directly into a drain using flexible 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 outlet, which must remain exposed and unconnected to any form of drainage at all times.

Indicator Lamp Check

To ensure that the Control Panel is displaying correct information, perform a check on the function of the Control Panel by re-setting the Autoclave power supply. The process of re-starting will illuminate ALL Control Panel lamps for a period of approximately 3 seconds. If any lamps are seen to be OFF during this time, report the error for further investigation.

Monthly Maintenance

(To be carried out in addition to weekly maintenance program.)

General Cleaning

Check exterior of machine and inside pressure vessel for general cleanliness, particularly around operating parts and external switches and pins Wipe over all surfaces using anti-bacterial wipes.

Empty all water reservoirs using a vacuum water remover if available. In order to prolong the lifespan of the heating elements, water level probe, etc., it is advisable to wipe away any spilled media, chalk, limescale, etc. on these parts or in the reservoir area. This build up should be minimised by the use of softened water and 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 to ascertain consistency of cycles. Any fault or defect reported or rectified immediately, and entered into a Maintenance Log. (This will assist a service engineer in locating any persistent fault and reporting it to the manufacturer.)

Automatic Water-fill

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 and the heating elements checked for signs of scaling.

Bi-Annual Maintenance

(To be carried out in addition to weekly and monthly maintenance programme.)

Hinges

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

Checking Temperature Control and Pressure Gauge

During the **DWELL** stage of a running autoclave cycle when the **Process Time** has run for at least five minutes, check the reading shown by the temperature display against that of the Steam Table in this manual.

A consistent disparity of readings would indicate either trapped air or a calibration issue. A note should be made of any observations in the Maintenance Log.

The pressure gauge and control system fitted to Priorclave 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.

Maintenance Log:

Date	Comment Type	Comment	Noted by

Maintenance Log

Date	Comment Type	Comment	Noted by

Fault Finding & Rectification Guide

If one of these faults occurs please contact your service provider with details of the fault and the serial number of your autoclave

Do not attempt to rectify these faults (with the exception the low water fault) yourself.

Symptom	Possible Cause	Possible Solution
No Power	Power switched off at isolator	Check
	Circuit Breaker Tripped	Call Engineer
	Electrical Failure	Call Engineer
	Emergency «E» Stop Button Pushed In (if fitted)	Release
Cycle does not commence when start button is pressed (Fault indicator flashes)	Door is not closed properly	Open & Re-close.
	Micro-switch Failure	Call Engineer
Heating slow or not apparent	Controller incorrectly set	Check setting & reset if necessary
	Circuit Breaker Tripped out	Call Engineer
	Heater(s) Failed	Call Engineer
	Heater(s) Over-scaled	Call Engineer
	Fault in control circuit.	Call Engineer
Low Water Indicator (F004) stays lit when correct water level is achieved	Low Water Conductivity i.e. Distilled water	Add Tap Water
	Probe dirty, damaged or missing	Visually check probe. Clean as necessary
	Wiring connections loose or damaged	Call Engineer
Autoclave does not pressurise	Vent button in open position	Check Vent Indicator and switch off
	Free-Steam time not completed (if option is selected)	Check Cycle Progress Indicator Display
	Air purge valve failure	Call Engineer
	Vent Valve stuck open	Call Engineer
	Safety Valve stuck open	Call Engineer
	Door incorrectly closed	Check door position
Incorrect Temperature/Pressure Correlation	Air not fully purged from autoclave. Due to :	
	Incorrect Load Packing	Re-Load and re-start cycle with (more) Free-Steaming.
	Faulty Air Purge Valve	Call Engineer
	Water covering Controller Probe	Check Water Level
	Faulty Controller or Gauge	Check function and calibration

Fault Finding

Symptom	Possible Cause	Possible Solution
Safety Valve opening	Temperature set too high	Check Temperature Setting
	Contactor Failure	Call Engineer
	Safety Valve Faulty	Check the seal 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 2.4 Bar. If not call Engineer
	Output board Failure	Call Engineer
Door will not open once Autoclave has cooled to 80°C	Thermal Lock Temperature not yet reached in Load Simulator	**WAIT.** Thermal Lock is set to Load and not Chamber temperature.
Door does not open when door button is pressed	Safety delay not completed	Wait while **'Hold'** is displayed in the temperature display
	Thermal Lock Temperature not yet reached in load simulator	Check Cycle Complete indicator is lit on cycle progress display.
	Faulty Door Solenoid	Call Engineer
	Thermal Lock previously overridden	Use thermal lock key to open door. Normal function will return after a complete cycle has been run.
Fault Indication will not go out	Fault not Re-set. (Refer to manual for list of Fault Codes)	Call Engineer

Autoclaves are pressure equipment and as such are potentially extremely hazardous if not correctly serviced.

If you have any doubts or If you do not feel competent to carry out any of the above procedures then do not hesitate to call Priorclave Service or your nearest Priorclave approved service agent.

This device may be fitted with a non-resettable thermal cut out to protect the heater. In the event of failure of this device contact Priorclave Service or your local authorised service agent.

Steam Table

Temperature		Pressure (BarG)
(°C)	(°F)	
100	212	0.00
105	221	0.20
110	230	0.43
115	239	0.69
120	248	0.99
121	250	1.06
122	252	1.13
124	255	1.25
126	259	1.35
128	262	1.55
130	266	1.70
132	270	1.86
134	273	2.04
136	277	2.21
138	281	2.40
140	284	2.60

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.

Steam Table

Notes

Notes

Other Items Fitted

Other Items Fitted

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: .....

Control Board Type: **Mini** ☐ **Full** ☐

Options Fitted:

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.....

.....

Accessories Supplied:

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Specification Sheet