

Astell

AUTOCLAVE & STERILIZING SOLUTIONS SINCE 1884

INSTRUCTION MANUAL

AMB220 | AMB230 | AMB240 | AMB420 | AMB430 | AMB440

AMA240 | AMA440

AUTOCLAVES & STERILIZERS

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INTRODUCTION

The "Swiftlock secure touch colour+" sterilizer models are modern, functional benchtop or floor standing autoclaves/sterilizers designed with ease of use in mind. They use a rapid-action "new Swiftlock" closure system to give easy and rapid opening of the chamber, together with a 5 or 10 program touchscreen operated control system, to facilitate a variety of uses.

WARNING IEC61010

In accordance with IEC61010

The safety features and protection for the operator in this equipment are only designed to operate when the equipment is used in the way described in these instructions. If used in any way not specified such protection may be impaired.

GENERAL OPERATION AND LOG-BOOK

Although the safety record of laboratory sterilisers is good, remember at all times that they store considerable potential energy, and should be treated with respect and care. If correctly used and cared for, your steriliser will give you long and safe service.

Pay attention to regular maintenance. Never force the locking mechanism, or operate the machine with any leaks, or incorrectly operating parts.

Report any defects to your supervisor. If deterioration or defects are noticed, record them in a log book and contact our Service Department. Record also the results of annual and periodic inspections. Every 4 to 6 weeks is recommended. Check the logbook before you start using the machine, as someone else may have recorded a fault of which you are not aware.

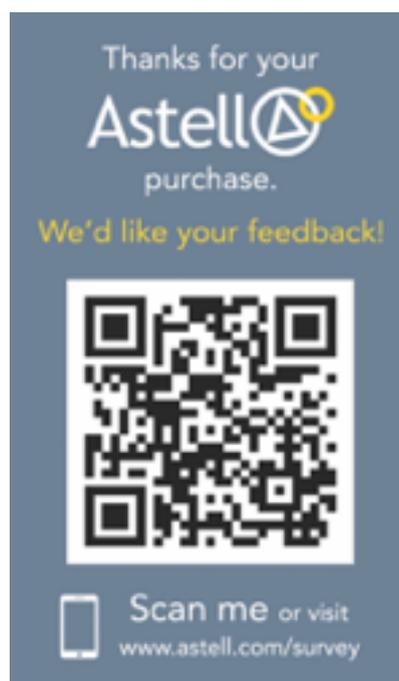
CUSTOMER SURVEY

Thank you for purchasing your equipment from Astell Scientific. We are committed to improving our customer experience through a continuous improvement monitoring program, and would appreciate your assistance in providing feedback of your experience.

We have created a short survey containing eight questions which will take less than 5 minutes to complete – you can find it here: <http://www.astell.com/survey>

Thank you for your assistance.

For your convenience, please use your mobile phone to scan the QR code on the right.



DOCUMENT ISSUES AND DETAILS

Date	Issue and Edition	Filename	Details of changes and revisions
08/2016	01a	IM_20_80_01a	Original issue
01/2017	01b	IM_20_80_01b	Survey request added
09/2017	01c	IM_20_80_01c	Pipework Schematic Updated
01/2018	01d	IM_20_80_01d	SGS and UKAS logos removed
06/2018	01e	IM_20_80_01e	Correct part numbers in Parts List
07/2018	01f	IM_20_80_01f	Add United Kingdom to Astell address
10/2018	01g	IM_20_80_01g	Add Customer Survey QR code
10/2018	01h	IM_20_80_01h	Removed MDD reference
01/2019	01i	IM_20_80_01i	Drying option addition
04/2019	01j	IM_20_80_01j	Add CFR option instructions

For the associated CONTROL SYSTEM PROGRAMMING MANUAL: PM_20_80_01f

SAFETY AND GRAPHICAL SYMBOLS

The following "ISO" symbols are used in this manual and on the machine

<p>Protective earth (ground)</p> <p>To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.</p>	
<p>Dangerous voltage</p> <p>To indicate hazards arising from dangerous voltages. Internal voltages are the same range of values as the mains supply to which the unit is connected.</p>	
<p>Hot surface</p> <p>To indicate that the marked item can be hot and should not be touched without taking care.</p>	
<p>Warning/caution</p> <p>An appropriate safety instruction should be followed, or caution, a potential hazard exists.</p>	
<p>Heavy</p> <p>This product is heavy and reference should be made to the safety instructions for provisions of lifting and moving</p>	
<p>Refer to manual</p> <p>Refer to the relevant instructions detailed within this manual.</p>	
<p>Service action required</p> <p>The relevant problem cannot be solved by the user. Attention is required by an engineer suitably qualified with this equipment.</p>	

SAFETY INSTRUCTIONS

The safety records of laboratory sterilisers are good, but remember at all times that they should be treated with respect and care.

Electrical and thermal fire risk

This equipment contains electrical circuitry which carries sufficient energy to cause and sustain a fire. Active system thermal energy-input protection and over-current protection is provided on all appropriate circuits. Safety-valve prevents excessive pressure build-up in the chamber. The equipment is protected from overheating by an electrical thermal cut-out sensing excessive boiler temperature.

Temperatures due to the designed heat source(s) in extreme fault conditions could attain 150°C internal to the chamber/boiler.

Handling/moving

Lift at sides or rear of case, taking the load of the unit on the base-plate. Do not lift or handle using the plastic door cover or control panel or any other projection. Do not drag across surfaces or the feet may be damaged.

Full details of weight and dimensions are supplied with the machine.

Handling steriliser loads

Due care should be exercised when handling loads and moving them in and out of the steriliser. The wide range of loads that are used means that these instructions do not cover instruction for manual handling of loads.

The users and supervisors of the machine must ensure that all local regulations for health and safety and manual lifting are complied with in the use of this machine. Written instructions concerning these matters and general laboratory practice for using the machine should be drawn up and all users should be trained in the safe use of the machine.

Damage disclaimer

The manufacturers or their agents cannot accept responsibility for damage or consequential damage that may be caused by waste heat, fire, exhaust gases, water, steam, or steam condensate should the machine be operated other than in accordance with the instructions in the provided operating manuals.

This disclaimer also applies if the piping or internal system of the machine is modified, misused, blocked or obstructed, or by use of non-approved alternative spare parts.

This disclaimer also applies if the system installation does not comply with the requirements of the installation drawings and other specifications that may be stated by the manufacturers.

GENERAL INFORMATION

Incoming Inspection

After receiving your Astell Autoclave, carefully inspect the outside of the shipping box for signs of damage. If any damage to the container is found, note the location with respect to the autoclave and check that area of the autoclave carefully once it is fully unpacked. Observe packing method and retain packing materials until the unit has been inspected. Mechanical inspection involves checking for signs of physical damage such as: scratched panel surfaces, broken handles, etc. If any damage is found, contact your dealer as soon as possible so that they can file a claim with the shipping carrier and also notify Astell Scientific. All Astell products are carefully inspected prior to shipment and all reasonable precautions are taken in preparing them for shipment to assure safe arrival at their destination.

Note: Lifting and carrying should always be done by two people.

Warranty

Astell warrantees, from the date of purchase, all new autoclaves for a period of one year, covering both parts and labour. This one year warranty covers defects in materials and workmanship on every part in the autoclave except door gaskets and filters (they are considered wear items). Astell warrantees the chamber for a period of ten (10) years against defects in materials and workmanship. This warranty does not include installation or operator instruction which are covered in this manual for your convenience or which can be provided by your dealer. This warranty does not apply to any instrument that has been subjected to improper use or accident, nor shall it extend to autoclaves that have been repaired or altered outside the factory without prior authorization from Astell. The warranty also does not include routine cleaning or preventive maintenance, to be performed according to instructions in this manual. Astell's obligation is limited to the repair or replacement of parts for the autoclave. No other warranties or obligations are expressed or implied.

The Autoclave should only be used in a manner described in this manual!

Note: *If you have any questions or there are any difficulties with this instrument and the solution is not covered in this manual, please contact your dealer or Astell Scientific.*

Do not attempt to service this equipment yourself.

LEGAL AND SAFETY REGULATIONS AND REQUIREMENTS

<p>Pressure Equipment Directive (European models)</p>	<p>Please note that this equipment is covered by the European Pressure Equipment Directive. This may already affect your premises and you will need to ensure that the machine is included in any scheme covered by these regulations.</p> <p>(USA models are manufactured to the European directive)</p>
<p>Periodic inspection and safety valve test</p>	<p>The manufacturer recommends every 4 to 12 weeks carrying out the periodic maintenance checks of the machine and the closure system (door) as explained in this manual.</p> <p>At intervals of 3-months carry out the safety valve test, as explained in this manual. If this test is missed the screen will display a warning that the safety valve test is overdue. To clear the warning you must carry out a safety valve test.</p>
<p>Log book</p>	<p>A log-book or similar record should be kept for each steriliser.</p> <p>This should record the results of</p> <ul style="list-style-type: none"> • Commissioning and calibration • Safety valve tests • Annual and insurance inspections • Faults and malfunctions • Service visits • Other actions or incidents <p>Check the logbook before you start using the machine, as someone else may have recorded a problem or fault of which you are not aware.</p>
<p>Responsible person</p>	<p>This equipment stores considerable thermal energy and could be hazardous if not used and maintained correctly.</p> <p>European models: European regulations* require that a responsible person should be appointed who will be in charge of the maintenance, safety, and operation of the steriliser and for user training.</p> <p>United States and Canada: All local requirements for pressure vessels must be complied with.</p>
<p>Training</p>	<p>It is the duty of the responsible person to ensure that all persons who operator or maintain the equipment have been trained in the correct and safe operation of the steriliser, including emergency procedures and what to do in the case of malfunction.</p> <p>The responsible person must ensure that all persons carrying out maintenance on the working parts of the steriliser are fully familiar with operation of the machine and suitably qualified for work on pressurised steam and safety related systems. This training should be regularly repeated and formally recorded in an appropriate training schedule and records of attendance of persons at training sessions should be included.</p> <p>Training should be organized and monitored so that evidence of understanding is demonstrated by the trainee.</p>

* (INTERNATIONALLY HARMONISED) standard 61010-1-1-ISSUE 3 section 5.4.101.1 and Pressure Equipment Directive. P.E.D

RISK ASSESSMENT – HEALTH AND SAFETY

This equipment stores considerable thermal energy and uses electrical power at hazardous voltages and currents. Steam sterilisers can be hazardous if not used and maintained correctly.

European regulations on health and safety require that a risk assessment should be carried out by the responsible body and any findings should be incorporated in the training of operators and supervisors and all others using the equipment. Where used in United States, Canada or outside Europe please ensure that your installation complies with all local regulations that apply.

Intended use of equipment	This equipment is intended solely for sterilisation and processing of biological materials to destroy pathogens. Precise details of loads and handling methods should be provided by the responsible body.
Technical specification	This is found in the original sales-documentation and/or machine drawings. Some information is also in the manuals that apply to this machine.
Name and address of manufacturer for technical assistance	Please see the front pages of this manual, or consult your supplying agent if this was not supplied direct from the manufacturer.
Risk mitigation	<p>The design of the machine has reduced the risk to the user to as low as possible. The safety interlocks built into the machine are designed not open to defeat or misuse. The primary risks associated with use of this equipment concern the operator handling of loads when loading and unloading the machine and use the unit only as a steriliser for the specified loads. The assessment should include instructions on and include the fact that the steriliser uses heat, and consequently hot surfaces and hot water is present. The machine design protects the normal user from contact with dangerously hot surfaces when the steriliser is operating. However, depending upon cycle or method of use, when the door is open, some chamber parts may be hot and could be hazardous to touch.</p> <p>Astell cannot advise on, specify or be responsible for aspects of safety regarding the load handling process or day to day laboratory procedures. The responsible person should perform this part of the assessment based upon safe laboratory working practices.</p>
Accessories and spare parts	<p>This equipment as standard does not require any specific accessories in order to operate without causing a hazard.</p> <p>Where spare parts are required these must meet the full specification of the manufacturer. If alternative unapproved parts are fitted to the equipment then the safety of operation may be affected and Astell cannot be held responsible for injury or consequential damage that may result from the use of these parts.</p> <p>To maintain your initial warranty, safety and performance only fit spare parts supplied by Astell Scientific Ltd.</p>

SPECIFICATION

CLIMATIC CONDITIONS



Storage conditions

Permitted temperature range -10 / +70°C

Humidity not specified but an equalising time is required- see below.

Storage of this product in cold or damp conditions may lead to a hazard or operating faults if the equipment is put into service before it has dried out and achieved equilibrium with the surroundings of the operating site. In this case place in the area where it is intended to use the equipment, before connecting the power supply allow at least 48 hours reaching humidity equilibrium. If there is no evidence of condensation on the equipment you may proceed with installation.



Operating conditions

Permitted temperature range 0-40°C

Permitted humidity mustn't exceed 75% mean non-condensing.

Do not site the equipment in an area where there are significant quantities of dust, which will gather on the electronics and cause malfunction.

Do not site the equipment in an area where spray or fumes from other equipment may enter the cabinet or cooling vents.



Steamy environment- WARNING

If a large volume of steam is discharged into a confined operating area the resulting condensation may cause a hazard or operating faults or permanent damage to the controller. This would not be caused by the small amount of steam generated in normal use when the machine is operated or the safety valve tested as in these instructions. It could be caused by a continuous leak of steam from a supply pipe, a badly maintained and failed safety valve, the user must ensure that all appropriate maintenance is performed to avoid such large steam leaks which are outside the scope of these instructions and outside the machine warranty.

WEIGHT AND DIMENSIONS

All physical specifications, including weight, dimensions, etc., are given in the installation drawing supplied with the machine.

ELECTRICAL SPECIFICATIONS

These instructions apply to a wide range of different machine model numbers and sizes which may have different electrical power ratings and specifications.

(Some models may be bespoke and have non-standard power requirements).



Installation

Information is provided for guidance purposes in the programming and installation manual.

Electrical rating plate

The full electrical specifications for the machine are given on the electrical rating plate.

This is attached to the machine at the rear of the cabinet.

Services – specifications

There are no air water or steam services required for this machine as standard - please refer to the programming and installation manual.

INTERNAL SYSTEM FUSES and TRIPS

The information here is given to advise the user what to do if fuse failure occurs.



Fuse specifications

Fuse failure or tripping indicates a technical problem which should be solved before the fuse is replaced or the MCB trip reset.

If fuse failure happens consult manufacturer or your agent before replacing fuses.

Please refer to the appropriate programming and installation manual for your machine.

Specifications, alternatives and variations

Any technical specifications given on the rating plate or installation drawing overrules any information or suggested values or parameters that may be given as an example in this and associated manuals.

SAFETY VALVE TESTING

Machine contains a safety valve!

To comply with typical safety regulations this must be kept in a serviceable condition and must be regularly tested.

Testing period

Test periods depend upon local regulations.

Astell Scientific advise that the safety valve should be tested in every month to meet the requirements of most countries for steam safety valve testing. It can be changed.

All models have an automatic safety-test warning system and monitor the date of the last safety test that was completed.

At power-on and cycle start the system checks the current date and shows a warning after the set period has elapsed.

Safety valve test program

A special safety test program is provided to carry out a valve test. This can be accessed from the site engineer level.

Safety valve location

The safety valves are fitted on the chamber. These are mounted inside the cabinet and normally discharge downwards to the floor (unless specified otherwise at time of order.) They are in a position to allow access for servicing.

To cancel warning

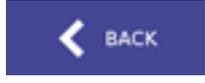
To cancel run a safety test cycle.
(You cannot cancel it in any other way.)

WARNING

The machine should be monitored continuously until the safety-valve test is completed. When the valve operates there will be a quantity of steam released with associated noise. This itself should not be hazardous but may surprise or alarm anyone nearby.

SAFETY VALVE TEST QUICK REFERENCE

- Touch 
- Select "SETTINGS MENU"
- Select "EDIT MACHINE SETTING"
- Select "SAFETY TEST"
- Select "SITE ENGINEER"
- Enter "333333"

- Touch  three times to return main menu.

- Close and lock door
- Touch  to select cycle.

- Select "safety test cycle"
- Touch  to start cycle

- Test cycle is now running
- Heating to set point 1. Press 
- Heating to set point 2. Press 

Continuously observe the pressure from this point. The operating pressure has to be between 3.45 and 3.68 bar (absolute).

After the valve operates touch  to terminate the test and advance machine into cooling.

Leave until complete and then open the door.

WARNING

If the safety valve does not operate at the stated pressure it must be checked and tested by a qualified engineer.

OPERATING INSTRUCTIONS

The following sections provide operating instructions in both a fully detailed version and short-form which can be copied and fixed to the wall near to the steriliser.

Full details of the program entry procedure and further technical details are provided in a separate programming manual.

Other options such as the RS232 communications option are detailed in separate instruction manuals.

Information on approved use

This equipment is not designed for use other than as a medical steam steriliser for use within the temperature and pressure ratings of the chamber design. It is intended for use by a health care provider to sterilise medical products by means of pressurized steam.

Never use the autoclave to sterilize corrosive products, such as: acids, bases and phenols, volatile compounds or solutions such as ethanol, methanol, chloroform or radioactive substances.

Any alternative use or method of operation not covered and specified within this and associated programming manuals is specifically excluded and may be hazardous. The manufacturer does not approve such alternative use and under no circumstances will the manufacturer or his agents accept responsibility for loss, damage, or injury, consequential or otherwise, as a result of such alternative use.

The manufacturer reserves the right in certain cases, to reassess and/or amend the design or specification, and provide individual written instructions detailing an alternative use that is considered acceptable.

Astell Scientific and approved agents are able to offer advice and assistance in setting up and commissioning this steriliser. Please consult Astell Scientific or an approved agent if necessary.

SECURITY PASSWORDS

The system protects from unauthorised use by security password codes.

Factory set numbers

- OPERATOR 111111
- SUPERVISOR 222222
- SITE ENGINEER 333333

If in doubt consult your supplier.

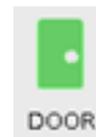
Passwords for Astell engineer access and above are available to suitably approved engineers on request.

Astell advises to change passwords after installation.

BENCHTOP STERILISER

QUICK REFERENCE

OPERATION GUIDE



[door]



[start]

1. Check that display power is on.
2. Press [door] button. The bolt will unlock.
3. Turn handle and open door.
4. Check if the gasket is correctly seated and inspect for damage.
5. If display shows "tank water level low". Add water to water tank until message disappears.
6. Load steriliser.
If the machine is fitted with load sense timing place load sensing probe in position in centre of load if the cycle requires use of load sensing.
If cycle does not require use of the load sensing probe, place the probe safely to one side of the load.
7. Close and rotate handle to lock.
8. Select cycle.
9. Press [start] button, cycle will begin.
10. When display shows "complete" at end of cycle, press [door].
11. Door unlocks, rotate handle and open door.
12. Open door fully and unload chamber.
13. If [door] button is pressed and door is not opened it will cancel after 10 seconds, and will re-lock. After this, to open, just press [door] button again.

AFTER USE

After unloading steriliser always leave cover slightly open when not in use to avoid compressing gasket.

CLEANING

Clean chamber regularly, as water contaminated with spilt load contents will cause failure and may burn out heaters or block pipework, valves or drains.

For detailed cleaning instructions please see page 38.

Notes: *If the door is closed by accident, press [door] key to open.*

If handle is rotated to locked position with door open, press [door] button and return handle to "unlocked" position.

OVERVIEW

The C70 controller provides an LCD full colour display with a led backlight system.

The front of the display is covered by a glass touchscreen which is sensitive to the touch of a finger or blunt stylus.

The system is able to detect the position on the screen that has been touched and can interpret this as if it was a "button-press".

The controller system is arranged to show a number of different screen layouts of information, together with the required "buttons" (shown on the screen as rectangles with bevelled corners)

When a screen shows a button, then a press on the button will select that item.

Screen brightness

The Screen contrast is adjustable.

There is a +/- brightness adjustment available in the main menu screen system info. (See Programming manual).

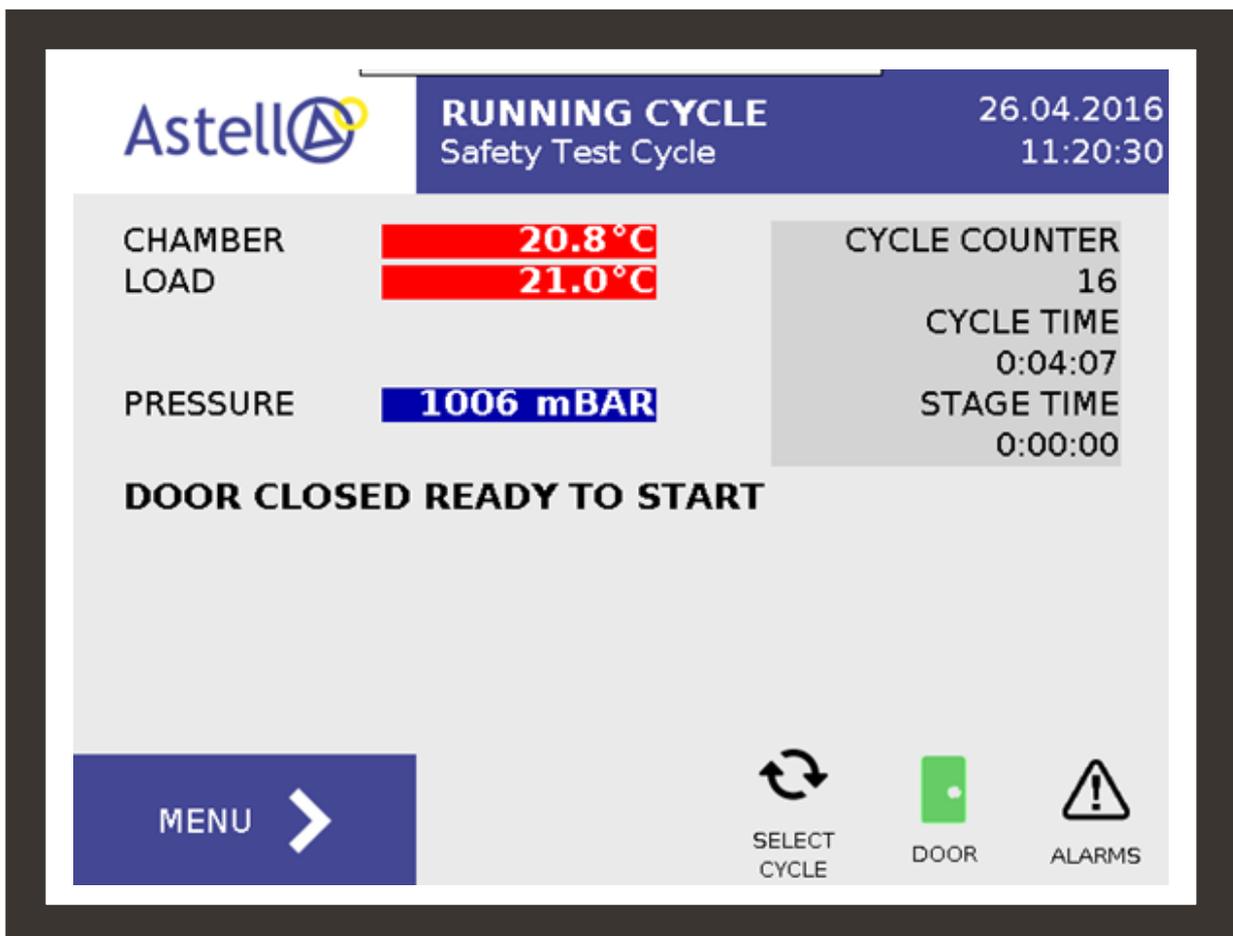
If the screen has lines or is smudged please advise your service engineer.

Display screen damage

As with computer screens generally, this screen is made of thin glass layers. These are easily damaged if they are impacted by a heavy object or excess pressure is applied to the glass. In this case the glass will crack and the display will have to be replaced.

Note that damage will not normally be covered within the warranty.

Typical view of controller in standby mode



SYSTEM CONTROLS

Power Isolator Switch

Turns on AC Mains Power to the system.

This is fitted to the Main Electrical Cabinet.

Marked 0/1.

The "1" position is "ON".

It illuminates when "ON" when mains AC power is supplied to the machine.

Cool lock thermostat(s)

There is always at least 1, and optionally up to 3 and they are sited inside the cabinet panel-work. These sense chamber temperature and used to restrict opening with hot fluid loads.

See "safety interlocks" section.

INSTRUMENTATION

These readouts are only displayed when necessary in the cycle.

Chamber temperature readout

Accuracy better than ± 1.0 °C

Load sensing temperature readout

Accuracy better than ± 1.0 °C

Chamber pressure display

Accuracy Better than ± 0.04 Bar

Chamber pressure gauge

Dial Bourdon pressure gauge at front of machine.
(Accuracy Better than $\pm 5\%$)

Timing

Various timing functions are displayed on the screen in MM:SS.

Instrumentation and system checks

In Standby/Ready state - with door closed- the system displays the current measured variables and the state of switches, interlocks and services. Any failures are reported as ALARM conditions.

Alarms

In the event of an instrumentation or sensor problem the monitor system reports this via the ALARM system. The ALARM icon flashes RED.

To clear the alarm

Touch the ALARM icon button.

This displays a chronological list of alarms which must be acknowledged by the user.

Over temperature thermostat

This is sited behind the cabinet.

This takes over control of the heater in the event of water loss or overheating. It resets automatically when the temperature falls.

Overheat safety cut-out.

This is fixed (not user adjustable).

This is sited inside the cabinet and cuts out the heater in the event of excessive temperature rise (typically >150 C). It is only resettable by manual operation when the covers have been removed.

INITIAL POWER UP

Make sure the power supply is turned on.

During power-up, the screen shows the booting process as the software loads, with a message "booting", then the Astell logo is displayed.

The system then goes to the operating screen.

BUTTONS AND DISPLAYS

Below are a selection of the buttons and displays that you will see on the touchscreen in normal use. Full details - see later in this manual.

Door open button

Press to unlock door



Alarm button

Display all system alarms.



Note: This button flashes red if an alarm is activated. After the alarm icon has been touched, the Password is used to cancel alarms.

Password screen

Allows the supervisor to enter their password.



Menu button

Takes you to the next menu.



Return button

Return from selected screens back to the start screen.



Up and down buttons

Move up and down through lists e.g. to select a cycle.



Cycle counter

This counter is displayed on various screens and indicates how many cycles the autoclave has run. This is not resettable.



Cycle Time

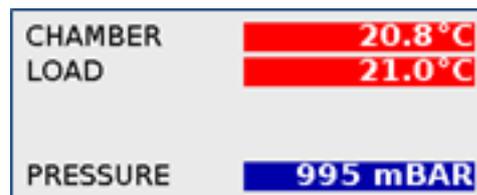
Time into current cycle

Stage Time - Elapsed time in Stage



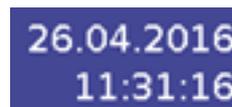
The temperature and pressure

Channels selected are displayed:

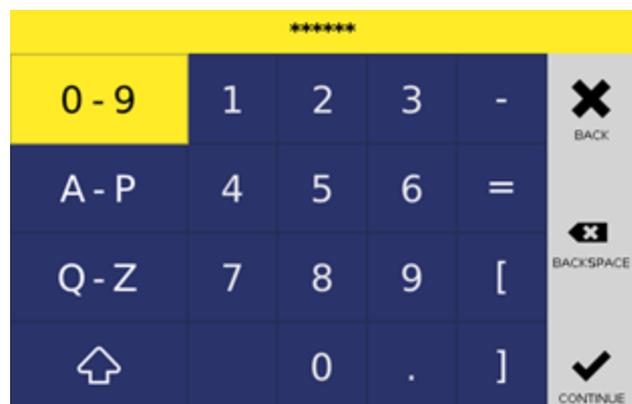


Date and Time

Top right corner of the screen.



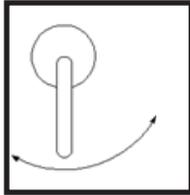
Alphanumeric keyboard



DOOR CONTROLS

OPEN

Touch the “closed door” button on the display screen to unlock the door. Then rotate the door handle clockwise to disengage the door bolts and open the door.



The screen icon will change to Door open:



If “closed door” button does not show on screen then the system will not allow you to open the door.

This is not possible or unsafe at this stage

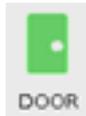
The door will open only if the safety conditions are all satisfied and no alarms are present.

HANDLE LOCKED WITH DOOR OPEN

If the door is open and you move the handle accidentally to the locked position it will lock in that position.

To restore normal operation

Press the [DOOR] button to unlock



Then rotate the handle to the unlocked position.

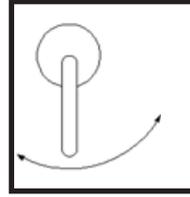
CLOSE

Close the door



The icon will change to “Door closed”

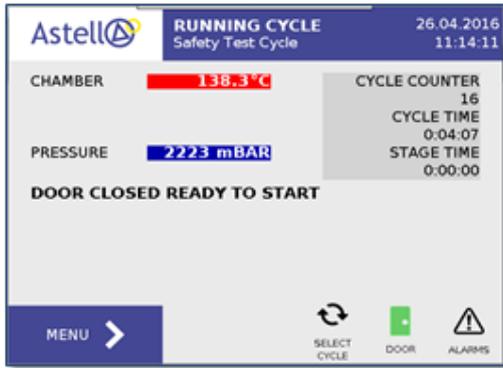
Then rotate the door handle anti-clockwise to engage the door bolts and secure the door.



Note: Do not lean on the handle or hang anything over the handle as this will cause the bolt to stick and will cause early failure of the mechanism.

SELECTING A PROGRAM

(Note - temperatures and times etc. will probably be different to the examples shown here).



Press "SELECT CYCLE" button

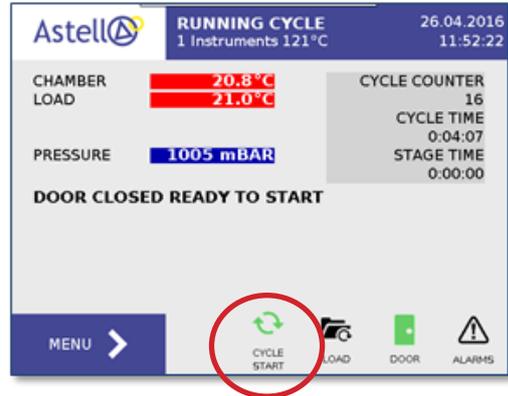
This will take you to a screen where you can select any one of the available programs.

Then touch the name of the selected cycle.



The display changes to show that a cycle has been selected and loaded

Cycle Selected



Changes colour to show cycle selected.

Change cycle

If you wish to select another Cycle press the "FOLDER" button, then select a different cycle.



WARNING!

The next press on the cycle button will start the cycle!



IMPORTANT

The names, numbers and types of program cycles available depend on the machine specification, and what has been set up on the machine.

This manual shows examples only and cycle displays will not be exactly the same as shown your machine.

STARTING A CYCLE

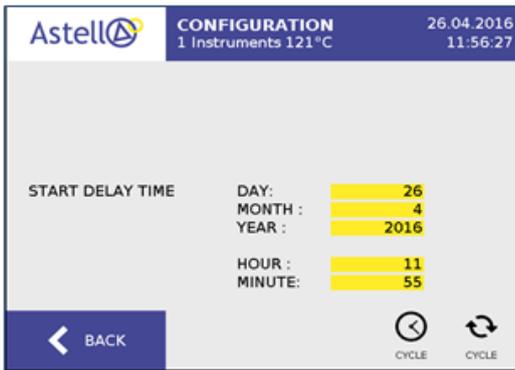
The chamber door must be closed and locked!

Select the chosen cycle (as above).
Press button to start cycle.

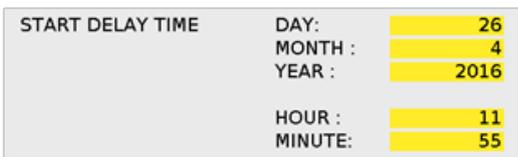


Delayed start option

If delayed start is not selected in settings the cycle starts immediately (see next page).



For each of the time or date figures you wish to change touch the figure on the screen e.g. to change the day:



Type the value you want using the numeric keys, then



press **CONTINUE**. When you are happy with the date and time shown press the clock button to save the changes.



When the elapsed time is up, the system will go directly to start.

Delayed start safety

If anything happens that could affect the safety of the unit, including the case of power failure, it will exit the delay start countdown automatically.

Manual override

Immediate manual start

- Press the Cycle Start button



Cancel delayed start

- Press
- Select



- Login with password
- Select with up and down arrows
- Press Continue
- Answer the "are you sure" question
- To start select stage
- To cancel select cooling



STARTING CYCLE (DELAYED START OFF)

The chamber door must be closed and locked!



- Select the chosen cycle, as above
- Press button to start cycle
- The system starts the cycle process



ACTION AFTER POWER FAILURE

If the mains power is cut or turned off when not running (in the standby stage) when restored the system behaves as above for power on.

If the power cut occurs during a cycle then the action when power returns depends on the setting of "power fail mode" in the edit machine settings menu.

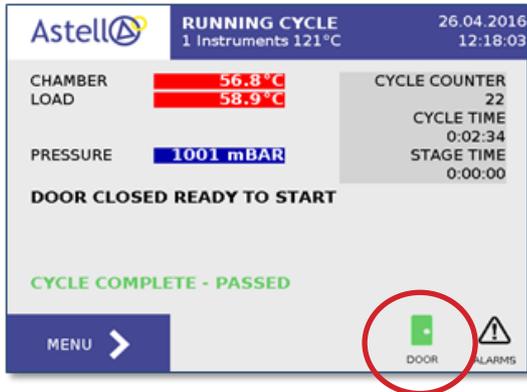
If set to "safe" the system will go to the standby stage (it may need to cool first) this will cause an alarm state. Cancel the alarm (refer to "alarms" section) you should then be able to restart the sterilize cycle. In the case of media cycles the media will probably be damaged and unsuitable for re-sterilization. For all loads involving pathogens, the load must be sterilized again before opening.

If set to "continue" then the system will try to return to the failed stage. If something has been changed in the off period this will cause an alarm state, and a failed cycle. Cancel the alarm (refer to alarms section) you should then be able to restart the sterilize cycle. In the case of interrupted media cycles the media will probably be damaged. For all loads involving pathogens, the load must be sterilized again before opening.

CYCLE COMPLETE - PASSED

If the cycle has completed correctly and no faults occurred the final stage is:

“CYCLE COMPLETE - PASSED”

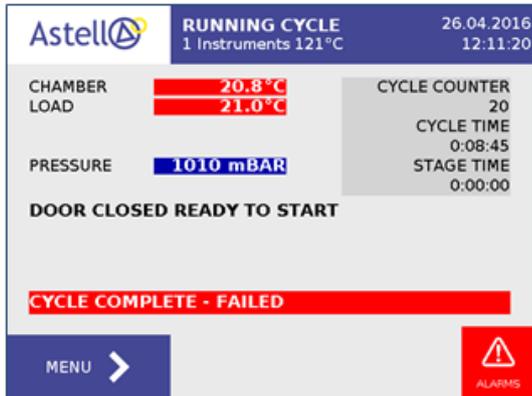


Press the “DOOR” button to unlock the door.

You can remove and use the sterilized load.

CYCLE COMPLETE - FAILED

If the cycle has failed for some reason the final stage is “cycle complete - failed”. No door button.



Press the “ALARMS” button - go to the alarms page so you can investigate, then correct and reset the alarm. You will need the supervisor level password or higher.

The sterilise cycle is over. Load may not be sterile. You will need to sort out the reason for the cycle failure.

You will then and be able to press the “DOOR” button to open the door.

If the sterilize stage has been set to “sterilize retry” then then you cannot open the door but you can restart the cycle.

Is the load safe?

After a failed cycle, if you can open the door, you can carefully unload the chamber but a decision by a suitably qualified person and microbiological assessment is needed before use of the load.

You will need to judge whether the load has undergone sufficient processing to be sterilised enough to be safe or satisfactory to use.

Sterilise the load again?

In the sterilize stage settings you can choose the action

- **Sterilize retry:** Do not open door - sterilize again
- **Safe stage:** Safe to open door

Some loads such as media preparation will normally be safe after a failed cycle and might even be useable, depending on what went wrong.

If set to “load is safe” then you must log in with the password and clear the alarm that caused the failure but you can then open the door and unload.

Is it unsafe to open the door?

If the load would have pathogens present due to the sterilization failure then handling it would be dangerous.

If set to “sterilize retry” then you will need to clear the alarm. Then the only choice you have is to start the cycle again. You cannot open the door.

SECURITY ACCESS AND PASSWORDS

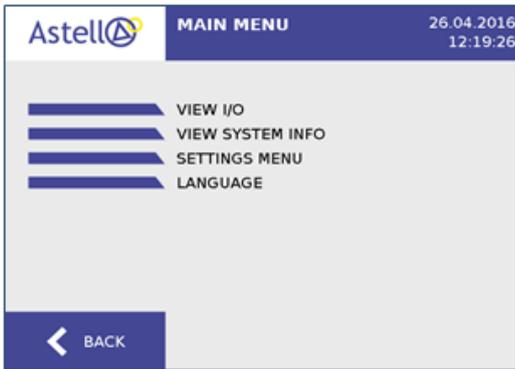
The security system splits the users of this machine into the following groups:

- OPERATORS
- SUPERVISORS
- SITE ENGINEERS

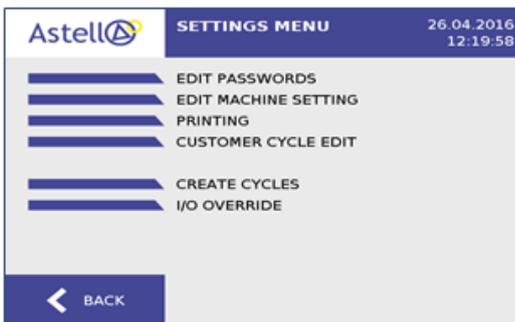
In each group there can be several individuals each known by name, and each with a different security password number.

ENTERING PASSWORDS

- Press the menu button for main menu
- Select settings menu



- Select edit passwords



- Now you have to log in with your password



- Touch your name or if you are a supervisor or higher level touch the "next" button to display the other groups



- Touch your user name. This takes you to the password entry screens

Password entry screens



- Touch on the passwords bar



- Type your password. Enter 6 characters followed by "CONTINUE"

Note: If you enter the incorrect password you are returned to the Main Menu.

TO CHANGE YOUR PASSWORD

- Log in as described above
- Press change your passwords



Select your group if required and your name, to get to the enter password screen.

- Enter your current password
- Then enter your new password



- Touch the password bar



- Key in the required password
- Press "CONTINUE"
- Confirm the new password when asked
- Press "CONTINUE"

Invalid passwords

- You cannot use the same password as you used before
- You cannot use The same password as another user

TO CHANGE / ADD USER NAME

SUPERVISORS
SITE ENGINEERS
ASTELL ENGINEERS
DEVELOPERS

The passwords and names for all levels of users are added and edited in the same way.

You can only change the security settings of a user who is at a lower level of access than you are.

Supervisors can change operators codes.

Site engineers can change supervisors and operators codes.

Astell engineers can change the site engineers, supervisors and operators codes.

Developers can change all codes.

- Log in as a supervisor or higher using an appropriate password

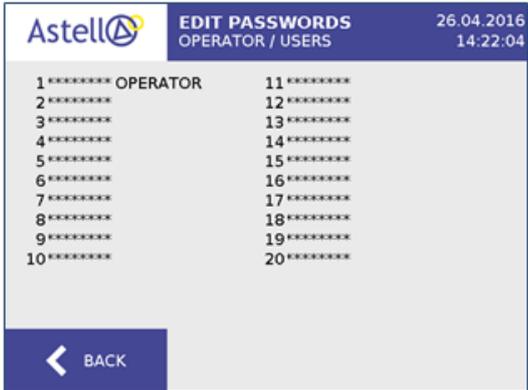




- Touch in black box
- Type the new name



- Press "CONTINUE"



- Touch the screen
- Touch a blank line on the screen



- Enter the new password for that new user
- Confirm the new password when asked
- Press "CONTINUE"

USING CFR USER LOGGING AND AUDIT FUNCTIONS

In addition to the standard Astell autoclave control system. There is now the ability to electronically record the following actions to assist with 21 CFR 11 compliance.

1. All setpoint and machine configuration changes are audited with user and date/time stamp.
2. Any changes to the machine configuration are audited with user and date/time stamp.
3. Any changes to the Cycle Type files are audited with user and date/time stamp.
4. Any changes to the Customer Cycle files are audited with user and date/time stamp.
5. Cycle log files are protected to ensure they cannot be modified.
6. All operator interactions are audited.

Initial preparations

The following information is intended for the person responsible for the administration of the users of the equipment and the maintenance of electronic records generated by the equipment.

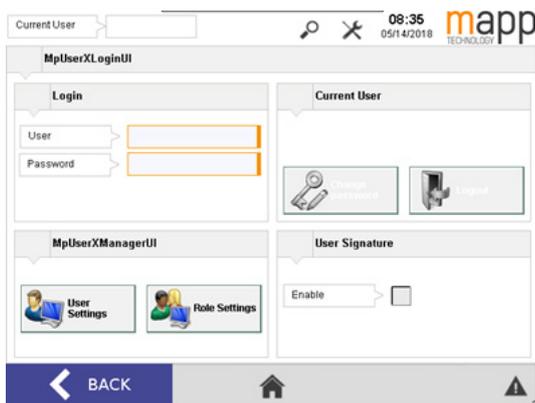
Log in as Administrator:

From the main screen, press 

and then 

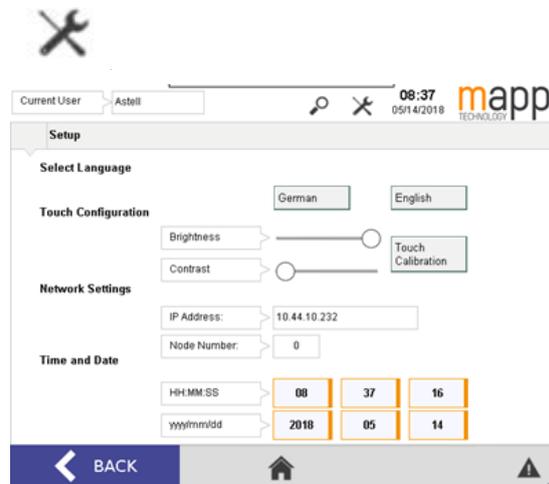
Login as 'Admin' with the password '555555'

This User is preset to give administrator access. (This can be changed to suit after initial set up).



Initial Set up

To enter the screen shown below, press the 'spanner icon' at the top of the screen.



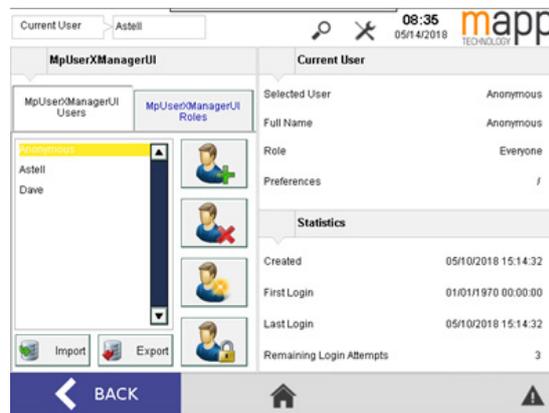
Set the Time, Date, Language and screen preferences.

Press the "BACK" button to display the 'User Login' screen.

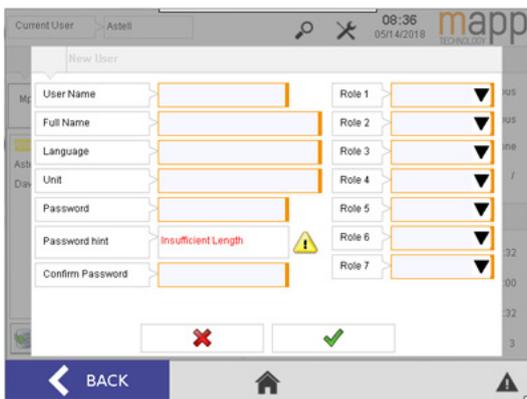
To add Users

To set up new users, you will have to be logged in as Admin, or other user, with administrator rights.

Press the "USER SETTINGS" button to show the 'User Manager' screen, shown below.



By pressing the  button. The next screen will allow you to set up a new users details.

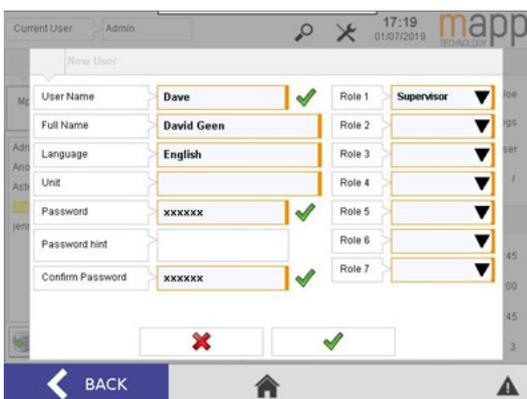


Fill in the details and select a 'Role' from the drop down menu – Role 1. ('User' for example).

Necessary fields are: User Name, Password, Confirm Password, At least Role 1.

Note: If you were to log in as a user with no role assigned. It would not be possible to select or run a cycle. Do not set up a user with Role – everyone assigned. (That user will not be able to log in).

Example of completed New User setup



To Amend a users details

Select the user to be amended by pressing on their name, in the 'User Manager' screen.

By pressing the  button, the users details screen will be displayed, and can be changed.

Note: Only a user with a role of 'Administrator' is permitted to amend another user.

To Delete a user

Select the user to be deleted by pressing on their name, in the 'User Manager' screen.

By pressing the  button, the user will be deleted from the system and no longer be able to log in.

Note: Only a user with a role of 'Administrator' is permitted to delete another user.

To Lock a user

Select the user to be deleted by pressing on their name, in the 'User Manager' screen.

By pressing the  button, the user will be locked. Their details will be retained, but they can no longer log in.

Note: Only a user with a role of 'Administrator' is permitted to delete another user.

Logging in and out of the system

The user will be prompted to log in to the system if they navigate to a screen page that requires a role level to access, or if they attempt to change a setting. A comment can be added to the record of any change.

The user can login initially by selecting 

and then 

If logged in as any user other than one with Administrator role. The system will automatically log out the user after a period of inactivity of 3 minutes.

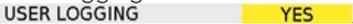
To Enable User Logging

To change this setting the user will need to be logged in with Admin rights.

From the Main Menu

Press "MENU" > Settings Menu > Edit Machine Settings > Options.

User Logging should be set to:

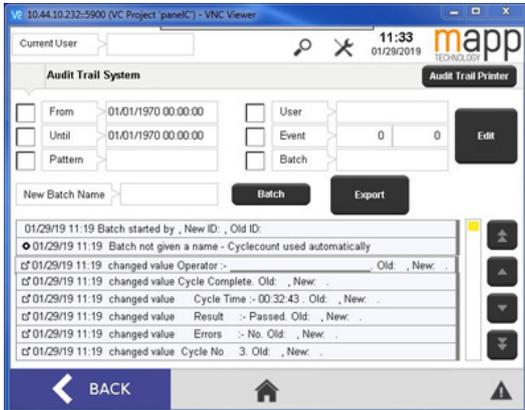


The system will now require a user to be logged in to select and run a cycle.

Audit Trail System

The software will automatically create a password protected audit 'archive' file each day at 16:00 hrs.

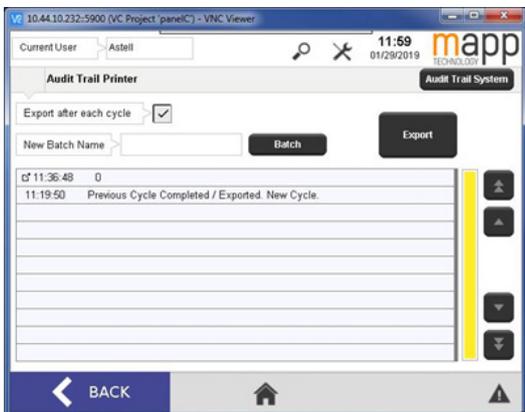
Alternatively, an 'audit' file can be created on demand by pressing "EXPORT" in the Audit Trail System screen, as shown below.



Audit Trail Printer

For each cycle run, the software will generate a 'log' file.

The software can also, automatically generate a password protected pdf copy of the log file by ticking the 'Export after each cycle' – shown below.



If the 'Export after each cycle' is not selected. A 'Printer Archive' password protected PDF file will be automatically generated each day at 16:00 hrs.

To create a backup of the audit files

To create a backup of the Audit files. Plug an empty, formatted USB drive into the exterior USB port.

On screen, navigate to the USB Backup / Restore page.



('Menu' > 'Setting Menu' > Edit Machine settings' > USB Backup / Restore)

You will need to login as a user with Administrator role.

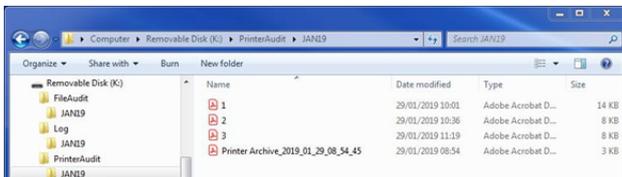
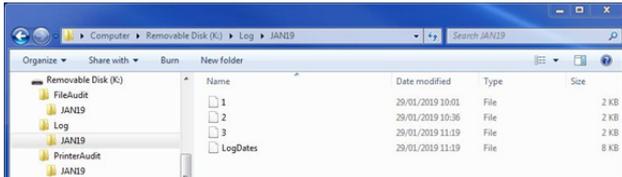
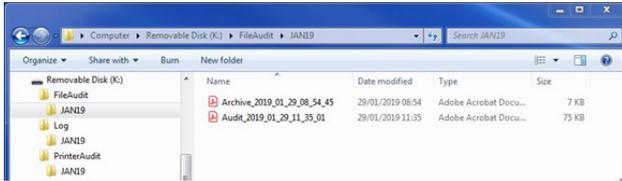
In the USB Backup / Restore page. Press



The USB drive can now be removed and its contents copied to, or viewed on a computer.

Viewing audit files on a computer

An example of the contents of a USB backup is shown below.



Each cycle run will be recorded as a 'txt' log file, and a password protected 'PDF' log file.

The txt file can be viewed using Microsoft Wordpad or Notepad.

The txt file is a copy of the printout from the intergrated printer, if this option was selected.

A password protected 'Archive' file is automatically generated. This file contains a record of:

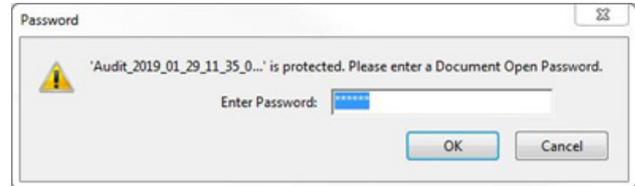
- User login and logout attempts.
- Any value that has been changed and by which User.
- The time and date that an event occurred.

To open a password protected PDF file

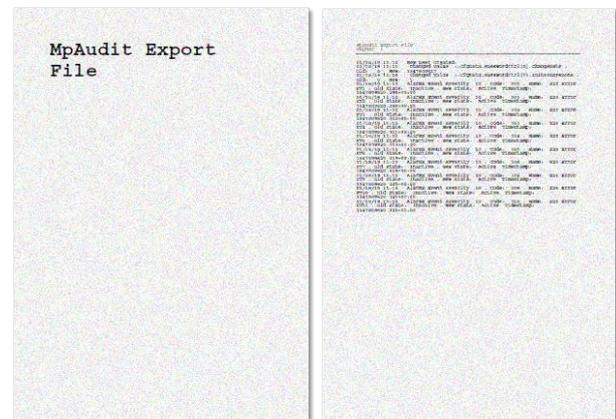
Double click on the PDF file that is required for viewing.

Adobe Acrobat Reader should automatically open and ask for the password.

Enter the password: 666666



The audit file should now be displayed. An example is shown below.

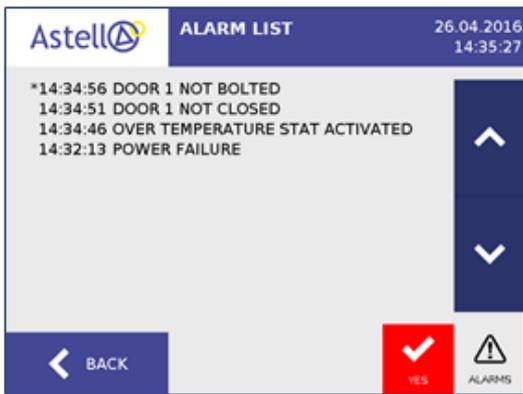


ALARMS

If any of the functions monitored for faults are triggered then the system will ensure that a safe condition is generated.

This may stop the cycle early and then go to cycle complete failed. The alarm button flashes red.

- Press the alarm button for the alarm list
- Login with your username and password
- Use up and down arrow buttons to select alarm
- When the source of the fault is removed and you press the acknowledge button, the button changes from flashing to continuous grey



If the button will not change to grey you have not cleared the cause of the alarm.



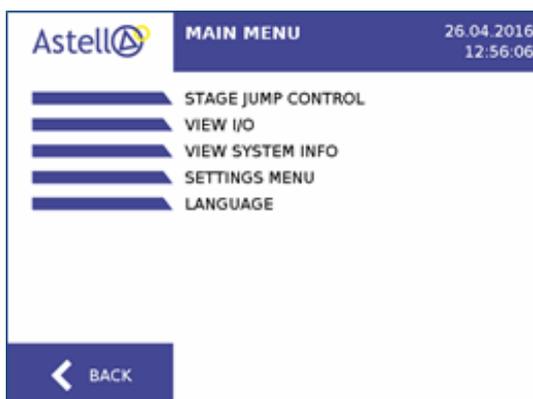
Alarm cancelled



Alarm still active

MANUALLY JUMP STAGES

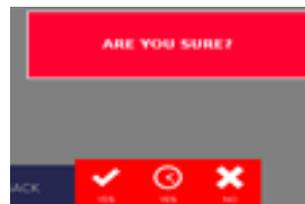
At any point during the cycle you can press the MENU button



- Press the stage jump button
- Login with your user name and password as described earlier
- Use up and down arrow buttons to select the stage you wish to jump to and press the tick to select



Answer the “are you sure question”



Note: Alarm icon will flash to show there has been a manual intervention. You will need to clear this before completion.

STAGE JUMP AND SECURITY LEVELS

- The stage jump facility is not available to the operator level
- Astell engineer level can jump all stages
- Stage changes will result in a “failed” cycle

SAFETY INTERLOCKS

Pressure interlock

Pre-set to less than +0.1 Bar this is an independent electrical interlock operated by a precision pressure switch preventing the electrical release of the door bolt if the chamber is pressurised.

Overpressure cut-out

This is pre-set to approx. 3.00 Bar. Above the safety valve point, and operated by the electronics control software. If the pressure sensed by the controller pressure transducer exceeds this level, which suggests safety valve problems, then the heating is shut down, a warning shown and a fault condition generated.

TEMPERATURE INTERLOCKS

Starting- interlock

Prevents starting a cycle with a dangerously hot or pressurised chamber.

Cooling locks

There are two cooling locks to prevent the steriliser being opened with a liquid load under unsafe conditions.

There are two cooling lock systems. They remain electrically locked until the load has cooled to a safe handling temperature cooling locks operate for destruct programs.

Warning- the cooling locks can present a hazard if incorrectly set.

They should be adjusted by the supervisor, or a person trained in steriliser use and the setting of safe steriliser cycles.

Pre-set cooling lock thermostat

This is a thermostat with dial and scale calibrated in 0-100°C at the rear.

It measures temperature of the chamber outer wall, with sufficient thermal mass for a reasonable match between the load temperature and the cooling lock set temperature.

Note: *The temperatures will not be quite the same, due to differing thermal inertia, between the chamber wall and the load. Normally the chamber wall and cooling lock sensor attached to it will cool down faster than the load.*

PROGRAM COOLING LOCK

The standard system operates when load sensing option is not fitted or not selected.

This uses a cooling-lock-temperature set by the user within each program profile which is compared with the chamber internal temperature sensor reading (the same temperature as appears on the temperature display).

When the chamber temperature is above this "program" cool-lock temperature the lock is active (engaged) and completion is inhibited preventing the door from unlocking.

Note: *The chamber-sensor detects the temperature within the steam space and it will normally cool faster than the load and/or the chamber wall.*

Load sensed cooling lock

If load sensed cooling option is fitted and selected for that program

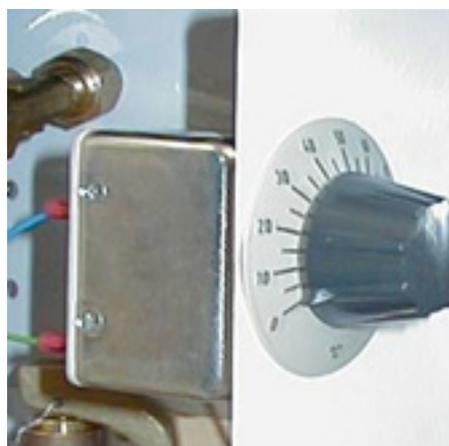
In this case the cooling lock temperature set for the program is not compared with the chamber temperature but instead the temperature measured by the flexible load sensor. When this load-sensed temperature is falling but still above the program's cool-lock temperature the lock is active (engaged) and completion is inhibited, so the door cannot be unlocked.

As the load sensing probe detects the temperature within the load itself, it will always represent the actual load temperature, assuming it has been correctly placed in the load.

Dual cool locks

Both cooling locks must be satisfied for them to release the door.

The temperature of load and chamber must both be below the two separately-set cool-lock temperatures to allow the cycle to complete.



Typical view of cooling lock thermostat

CLOSURE SYSTEM INTERLOCKS

The cover is prevented from being opened by a solenoid locking bolt pin. This locking bolt pin engagement and cover position is sensed by high-reliability micro-switches. The system cannot be started unless the closure is fully secured and locked. The closure interlock system senses the position of 2 of the sliding bolts that hold the cover shut, and also detects the "engaged" position of the solenoid locking pin that prevents the handle being moved.

The cover cannot be opened if:

- The chamber temperature is above programmed cooling lock setting and pressure is above approx. 0.1 bars
- The program cooling lock temperature is set within each program, but the pre-set cool lock temperature is a single setting applying to all programs
- The cover is also locked if power is off
- There is a delay of typically 5 seconds after pressing the door button before the locking pin retracts, and during this the vent valve is open to atmosphere
- The cover can only be opened by pressing the door button and waiting for the bolt to unlock

HEATING SYSTEM

Steam is generated from water held in the base of the chamber. The electric heating system uses an electrical immersion heater and a water level conductivity sensor acts at filling level.

An over temperature thermostat limits heater temperature rise if the system should fail or boil dry.

FREE STEAMING SYSTEM

Note: "free steaming" is the term used here to describe an initial period of steam flushing at atmospheric pressure which uses the steam to displace the air from the chamber.

The program profile control provides an adjustable period of free steam to ensure steam penetration in loads such as petri dishes, sample tubes, etc. with large numbers of trapped air spaces.

The temperature at which this starts is just below water boiling point. This can be adjusted to allow for altitude effects.

TEMPERATURE CONTROL SYSTEM

The chamber temperature is measured by a PT100 precision sensor. This measurement is compared with the sterilize temperature. The set point stored in the program profile, and the controller acts to keep the chamber at or about that temperature by switching the heat source on and off. Control of temperature does not rely on steam pressure.

The actual temperature that the control system attempts to attain is varied automatically at different parts of the

cycle. This does not require user attention during the cycles.

STERILIZE TIMING SYSTEMS

- Standard timing system

This operates if load sensed timing option is not fitted, or if fitted but it is not selected for this program. Timing starts when chamber reaches set temperature, and terminates sterilization at end of set period. Temperature and time are set within the program.

- Load sensed timing system (optional extra)

Load sensed timing is selectable (on or off) within each of the programs.

COOLING

Cooling action operates when appropriate in the program and only works for program types that do not permit drying, e.g. fluids cycles

At the end of sterilize initially convection ambient cooling cools the chamber to a pre-set pressure threshold without the assisted cooling fan system running and the chamber then continues to cool until the cooling lock(s) are satisfied.

If the cooling fan option is fitted the fans will start at an appropriate temperature, normally pre-set to 105°C, which may be adjusted if required.

DRYING

The autoclaves can be equipped with an optional Air Drying system. This includes an air pump that during the drying stage draws air through a filter and blowing air above the heater when it pulses to remove moisture and facilitate the drying operation. Drying is performed with the door closed.

FAST MANUAL EXHAUST OF STEAM (NOT AVAILABLE)

Please note that this machine design does NOT allow the operator to exhaust steam at the end of a sterilize period or any other time.

All controls of cooling and steam exhaust are built-in to the cycle profiles and optimised. Nothing would be gained by having this override manual control but many factors count against this.

This provision has been present on other makes of machine with older simpler control systems, with a valve allowed the user to exhaust the steam.

Astell machines are designed to operate in compliance with the EU directives on safety, including the PED and EN 61010. These preclude the use in this manner.

The amount of steam produced when a chamber pressurised to 120°C+ is exhausted is large and can constitute a serious hazard. Unless special high temperature exhaust pipework is installed in the building to take this exhaust away to a safe discharge. Also the steam produced would get into the inside of the case and condense on the electronics systems. This would cause damage very quickly.

If the load contains fluids then the action of exhausting the steam would cause the fluid load to violently boil over and empty the load contents into the chamber, which quickly will "gum-up" the valves and pipework. Also if such a load was removed even after it had appeared to stop boiling over, then it would be very likely to flash-boil again into the face of the user carrying the load.

Health and safety requirements in the EC require that generally such a load is not handled at a temperature above 80°C.

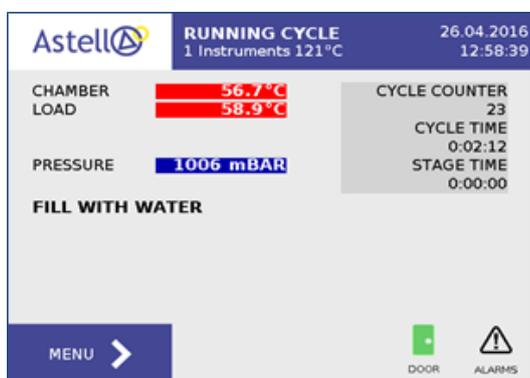
FILLING WITH WATER

CLASSIC MODELS

The machine is fitted with a conductivity sensing water detection system. This shows water level with a fill with water message.

If demineralised or distilled water is used for initial filling, the "fill with water" display may stay on even if the water level is adequate. Should this happen, add 0.5 - 1 litre of hard tap water. This should provide sufficient conductivity to activate the sensor system.

The system senses the conductivity of the water via a "high level" probe. The probe is set at a reserve level and the chamber must be filled, to this level to ensure sufficient water to complete a sterilize cycle. This water detection operates when the machine is not running, i.e. when the cover is open, or before pressing "start". This water reserve level is set to permit adequate free steaming.



- Open the chamber and pour in water
- Add water to the chamber until the fill with water display disappears
- The water-level in the chamber will then reach the high level probe, sufficient for a cycle. It is not possible to start the machine in the low water condition
- The chamber should not be over-filled
- It is best to pour in the water fairly slowly. If too much water is added or it is poured in too quickly frontload models will overflow and top-load models will not heat correctly
- The control system monitors the water level and prevents starting unless there is enough water to complete a typical cycle

WATER LEVEL - VISUAL CHECK

- Frontload models: The correct level is the point where the water just reaches within 0.5-1cm of the front lip of the chamber
- Top-load models: Lift out the load support plate or lower shelf. The filling level is correct when the tip of the water level probe dips about 3 mm under the water surface

Note: The temperature sensor is the 3mm diameter stainless rod which projects approx. 110 mm into the chamber. This must be above the- water.

AUTOFILL MODELS

The steriliser uses water held in the internal tank with a removable cover.

Tank filling level

Inside the tank there is a stainless steel plate, near the top and visible through the open cover. The top surface of this plate indicates the maximum water filling level.

DO NOT FILL ABOVE THIS LEVEL

The control system monitors the water level in the tank using a built in float switch and prevents starting unless there is enough water to complete a cycle.

Water and electrical safety

During filling if a spillage of water penetrates the cabinet or vent holes, stop using the steriliser. Turn off at the power source, mop up the water and call a service engineer immediately.

WATER QUALITY

Untreated tap water of drinking quality is satisfactory in this steriliser although the use of treated or partially demineralised water is acceptable, particularly in extreme hard water areas. This will help reduce furring on the elements the water must be conductive, requiring ionic content.

Deionised or distilled water is not acceptable.

The water used must be conductive, i.e. have an ionic content. Tap-water of drinking quality is suitable. Deionised or distilled- water will not work in this steriliser unless a suitable ionic salt is added. Please consult your dealer for advice if you wish to use treated water.

Soft water

Water that has been chemically softened is usually acceptable, but water that is from a naturally soft source may be unsatisfactory.

CYCLE DETAILS AND DISPLAYS

Each cycle has a set of pre-defined settings and the cycle stages are selected to suit the load.

Different cycle types have different combinations of stages.

The engineer / supervisor security level and above can access the adjustable parameters which can be changed to suit the size and nature of the load.

Features of the cycle stages

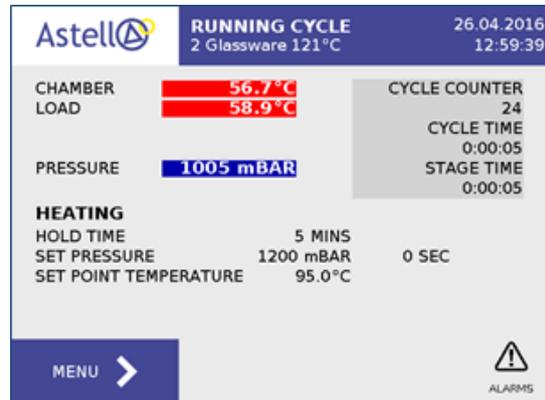
- Free steaming: The water in the chamber is heated and when the internal pressure exceeds 1.0barabs the air/ steam is exhausted at up to 100°C through the vent valve.
- Heating to sterilize: The chamber heats until the sterilize threshold is attained; either the chamber or the load reaches set temperature. See load sensing.
- Stabilization: A short one minute delay to allow the system to stabilise before sterilizing continues.
- Sterilizing: The sterilizing time starts automatically under program control when the system attains the set temperature, or see load sensing.
- Load sensed timing: If load sensed process timing is fitted and set up correctly then the system will ensure that the load heats to process temperature as quickly as possible and is processed at the set temperature.
- Cooling: A period of natural cooling for fluid loads on models with cooling option cooling fans are helping to cool the load down.
- Cycle complete: Chamber is cooled to a point where it is safe to open. Open door and load may be removed.

Note: Correct sterilization is dependent upon the cycle being suitable for the load and type of processing required.

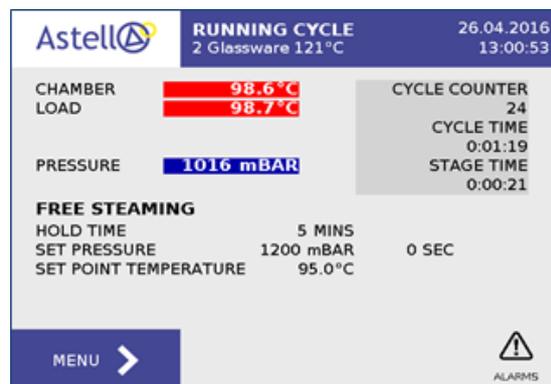
FREESTEAM STAGE

Not all machines will have all the stages that are listed here. Different cycle types may have different combinations of stages. If special custom stages required they can be created for special purposes.

This stage is used for air removal to gradually warm up the autoclave and load (< 100°C).



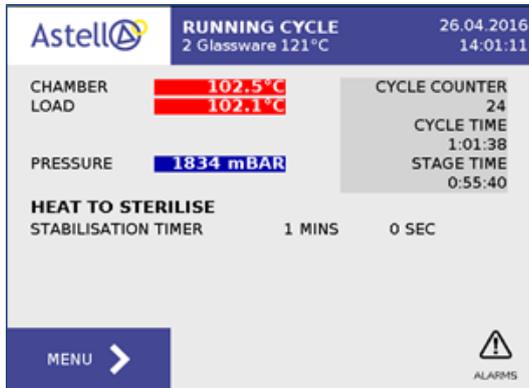
- Hold time = the free steam time
- Chamber temperature will rise towards 95°C
- When this temperature is reached the free steaming period starts



The chamber temperature will stabilise and slowly rise - typically 97-103°C depending on altitude and the boiling point of water. After free steam time ends, the system goes to heat to sterilize stage.

HEAT TO STERILISE

This stage is before the main sterilisation process, the stage is controlled by pre-set pressures and the selected temperature probes. The stage continues for a predetermined time (stabilisation time).

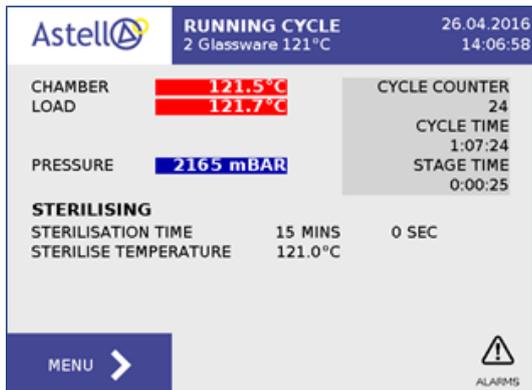


STABILIZATION TIME

This is a time for the system to stabilise before sterilize time starts. All materials take time to heat up because of the thermal mass. Although the chamber is at sterilize temperature stabilization period is required to let the load catch up with the chamber temperature.

- The sterilise temperature is reached
- The stabilisation time begins
- The stage continues to show heat to sterilize
- But the stage timer counts up to the timer setting

STERILIZING



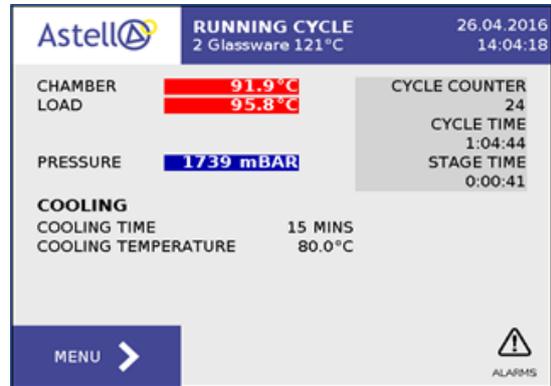
This stage is the main sterilisation process. The stage timing is controlled by the selected temperature probes and the temperature by the pressure set-point. The stage continues for set sterilisation time.

Sterilise temperature - Set sterilization temperature

Sterilisation time - Set sterilization time

COOLING

This stage cools the autoclave and load. This continues until the temperature of the selected probes and a cooling thermostat interlock have satisfied the set conditions (usually below 80°C as per HTM2010) and a minimum time has elapsed.



Cooling time - Time allowed cooling before the next stage

Override time - Maximum time period allowed for the stage

Cooling temperature - Cooling lock release temperature

DRYING – (OPTION)



Drying is only available as an optional extra and therefore should not be set if the required hardware is not present.

A period of drying to make sure all loads coming out dry. An air pump runs through this stage which blows fresh air to the heater element to help evaporate any moisture.

SET CLOCK - TIME AND DATE

- Go to main menu / settings menu
- Select edit machine settings
- Select parameters
- Select set date and time
- Login with your password
- Select the parameter you want to edit



- Type the value you want using the numeric keys
- Then press continue
- When you are happy with the date and time shown press the time set button to save the changes



STERILISATION CYCLES NOTES AND ADVICE

This information is in addition to information on sterilisation cycles given in the programming manual.

This machine is delivered with two basic types of cycle. Other cycles may be entered based on either of these.

1. **Fluids cycle**
2. **Dry cycle**

FLUIDS CYCLE

This is suitable for processing media or other fluids in unsealed containers.

DRY CYCLE

Suitable for instruments, dry glassware etc.

Note: *This is not intended for sterilizing fabrics or porous loads. You may sterilize these loads however they may come out wet.*

SELECTING A FREESTEAM TIME

Free steaming times are between 3 and 20 minutes.

Longer than 15 minutes on an unloaded or lightly loaded chamber may cause problems with boiling dry open load containers without drain holes which can collect and trap condensate from draining back down to the chamber base – can retain water causing boiling dry .

Long free steaming times can mean excessive heating in the condensate bottle and potential hazards from steam and condensation.

Please ensure that the load and containers match the selected cycle.

LOADING & PLASTIC BAGS

Note that the worst loads for air removal are loads in plastic bags, loads with lots of small spaces like petri dishes, small bottles etc. These will always need a longer free steaming period. Best performance is obtained when plastic bags are not used.

If it is in a plastic bag this should not be sealed and the top must be opened up completely and ideally rolled down so that the maximum area of the load is exposed to the steam without the top of the bag getting in the way. The container holding the bag must have large holes on the sides to allow steam to enter the container sides and the plastic bag must be slashed or cut with a knife through these holes so that the steam can get into the bag.

A variety of different special containers are available from Astell that contain the load and allow thorough air and steam passage, whilst maintaining integrity and facilitating pouring away liquid residue. Please consult your supplier.

SELECTING STERILIZE TEMPERATURE / SELECTING STERILIZE TIME

The UK Medical Research Council recommended the following time/temperature relationships for the achievement of sterilising conditions:

Minimum sterilize temperature	Maximum sterilize temperature	Minimum sterilize hold time
134°C	138°C	3 min
126°C	129°C	10 min
121°C	124°C	15 min
115°C	118°C	30 min

Lower temperatures or shorter times may have to be used to prevent degradation of bacterial growth media. This may be adequate for culture purposes, but does not constitute full sterilization. The manufacturer of the media will usually specify the sterilizing temperature.

Temperature Tolerance

Please note that during sterilizing the temperature will normally cycle up and down over a range of approx. $\pm 0.7^\circ\text{C}$ around the set sterilise temperature.

Specified settings	Recommended cycle settings
134°C -0+4 3 min	135°C or 136°C 3 min
126°C -0+3 10 min	128°C 10 min
121°C -0+3 15 min	123°C or 122°C 15 min
115°C -0+3 30 min	116°C 30 min

Load sensed timing

Allowance for extra sterilise time for load to reach sterilise temperature.

Fluid loads normally require an allowance for extra time for heat-up as they suffer from high thermal inertia. If the load sensed timing option is not used an allowance is needed for the time taken for the load to catch up with the chamber temperature. Extra time should be added to the sterilise time to compensate.

STERILISING – STAGE PARAMETERS

Example for 123.0°C

Monitor time

This is the maximum time in stage before a fault is triggered. Must be greater than the stabilization + sterilize time. Usually 60 minutes for 15 minutes sterilize time.

Print interval

See above.

Sterilization time

This is the time for the sterilizing period. Typically 15 minutes at 121°C.

Sterilization temperature

This is the temperature for the sterilizing period. E.g. 123.0°C actual value depends upon, the load and required sterilization conditions.

Temperature

Drain /chamber	123.0°C
Load	123.0°C

(Load only shows if load sensed probe is available)

MEDIA HOLDWARM

If media hold warm is required at the end of the cycle, then hold warm should be set to on in the cool stage cycle settings.

The hold warm system is designed to allow sterilisation of media loads, with a holding stage during the cooling process that maintains the temperature of the load and chamber warm enough to permit pouring of the melted media. The media will be kept warm for up to 48 hrs. The autoclave may be set to operate overnight with a media load, in the knowledge that it will contain a usable load when opened in the morning, or later in the day.

COOLING LOCK SETTINGS

During cooling inside the chamber, the load cools slower than the chamber temperature and gives up heat to the chamber walls. This means that the chamber will reach 80°C before the load so (unless load sensed timing is fitted) the cooling lock setting will need to be below the temperature.

It is possible to set the cooling locks in a simple way as shown below, but they are ideally set using a thermocouple (T/C) and digital thermometer with the T/C sealed inside the chamber immersed in the liquid load. This is quicker and more accurate but is normally carried out by a service or commissioning engineer requiring use of a thermocouple entry adaptor, and details are in the service manual.

To set the cooling lock without a thermocouple, a laboratory liquids thermometer reading to 100°C is required.

Load the chamber with the desired load, and make a first approximation of cooling lock temperatures. 80°C is suggested for both the program and pre-set settings. Start the cycle and allow it to complete. Very carefully remove the load, using insulating gauntlets and suitable face protection in case the load is too hot. Immediately measure the temperature of the liquid in the load container that was nearest the centre.

Record this temperature and compare it with the desired opening temperature (80°C suggested).

The measured temperature is likely to be higher than the desired temperature. Adjust the program and thermostat cooling lock settings as required and repeat the cycle with the same load, open, measure and re-adjust if required. Continue until the desired cooling lock release temperature is reached.

PRESSURE SWITCH INTERLOCK



Typical view of pressure switch

The fault system should indicate a pressure switch fault this usually indicates a bad pressure adjustment or drift, and is seldom a pressure switch failure.

The pressure switch should release at approx. + 0.1 bar Due to age or stress this setting may drift.

The system monitors this switch as a safety feature to prevent opening the chamber if the pressure exceeds 0.1bar.

Observe the pressure and temperature displays.

If

- The Pressure displayed is close to Atmospheric pressure (e.g. around 0Bar)

And

- The temperature is near to room temperature

And

- The display still shows the fault as above

Then, the Pressure switch may be out of adjustment.

It may resolve itself if left for 1-2 hrs. to cool down.

If this continues, the pressure switch should be checked and adjusted - please contact your service agent or Astell Scientific for advice.

WATER LEVEL SENSOR PROBLEMS

An example fault here is that the system starts without taking on water. This occurs if the water level sensor is already falsely detecting sufficient water present.

A correctly installed and functioning system cannot start to heat until the correct water level is present in the chamber, but it is important that the sterilizer is installed with the feet on a horizontal surface. On frontload models the front of the machine is higher than the rear so the chamber is tipped backwards.

The usual cause for this is that the water is not entering at the start to the correct level because the chamber water level sensor has been damaged or is missing or is being touched by some other conductive object.

Inspect the water level sensor fitted through the rear or on top load models, through the side at the base of the chamber. This is the 3mm thick brass strip approx. 20mm wide, pointing down towards the water. When the water reaches the tip of this it makes contact and the electrical conductivity of the water completes the circuit to the boiler which is sensed to measure the water level.

Possible problems

- That the sensor strip is bent and touching something metal
- The load supports are defective and a metal load container or shelf is touching and shorting out the sensor.
- The sensor is dirty. Congealed effluent from the load has coated the insulator shorting the sensor out to the boiler wall.

Check that nothing is touching the sensor and that it and the insulator are clean. A Scotch-Brite pad is useful for this. If the problem continues service attention will be required.

OVERHEAT FAULT

If there is a water level problem or a valve sticks open, blowing out the water and the system goes to boil dry, then the heater will be exposed and the over temperature thermostat will start to operate. This will take over control and shut down the heater until the temperature falls.

This will cause the temperature to vary very widely up and down as the heater cuts in and out.

The pressure will not match the temperature

E.g. the chamber might be above 100°C but the pressure might be zero or much lower than normal.

Service attention will be required.

LOAD SENSED TIMING (OPTIONAL EXTRA)

All sterilizer loads have thermal mass. This means that the load will always heat up more slowly than the sterilizer chamber. If this is not allowed for in timing of the sterilize program profile, the load will not be subject to correct sterilizing conditions, i.e. it will be exposed to the set temperature for too short a time. Load sensed timing avoids this problem.

Load sensed timing is selected in the cycle settings sterilise stage by setting a load temperature.

If set to an appropriate temperature such as 121°C then the load sensed timing is ON.

If this is set to 0°C then the load sensed timing is OFF.

Please see the programming manual for full details

Important

The position of the load sensing probe is very important. The probe must be in the same place for running cycles as it was when the cycle was commissioned, so you will need to set up a laboratory procedure to ensure it is always placed correctly.

If correctly positioned the load sensing probe detects the temperature within the load and so will ensure that the load experiences the set conditions for the set time.

If it is just put to one side of the chamber instead of in the load then fluid loads will experience only a very short time at sterilise temperature or may not reach sterilising at all.

Special load sensors

The load sensor provided with this system is a 5-6mm diameter flexible type. This may be too stiff or solid to use for some loads.

Alternative probes may be available. Please consult service department or your dealer.

COOLING LOCKS AND LOAD SENSED TIMING

Selection of the load sensed timing function in a liquid or waste destruct cycle also implements a load sensed cooling lock for that cycle. In this case the cooling lock senses and acts upon the actual load temperature

The cooling stages operate normally but the complete stage cannot be reached until the load, and hence the load sensing probe has cooled to a temperature below the cooling lock temperature set for that program.

Set the cycle's cooling lock temperature to the actual temperature of the load at which the cooling lock is to release and allow the door to be opened. It is advisable to err on the cooler side, for safety.

OPTIONAL PRINTERS

PRINTER INDEPENDENCE

Please note that the fitted printer is not independent from the controller and has no separate sensors or intelligence. It records from the control sensors and prints the same data as available on the display.

If your QA requirements dictate that the printer must give a totally independent record of measurements please consult your agent or Astell Scientific. A range of independent printing solutions are available that work together with these models.

Printers available

- Internal standard printer option.
Please see instructions below.
- External printer option.
Please see separate manual for external printer option.
- External user-supplied RS232.
Please see separate manual for RS232 communications option.

INTERNAL PRINTER OPTION

The standard printer supplied is the Astell type MPP537X. This is a 40 character dot-matrix impact printer which prints on 58mm wide plain roll paper. It uses a replaceable ink ribbon cartridge and prints in one single colour (black).

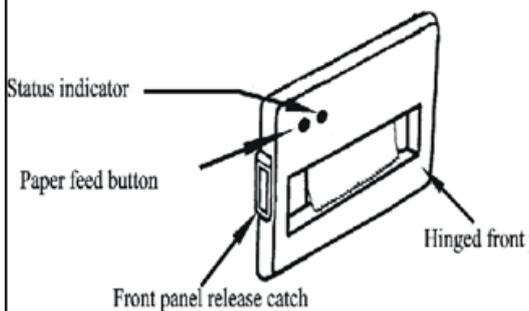
Top load models

The printer is mounted in the front face of the machine.

Frontload models

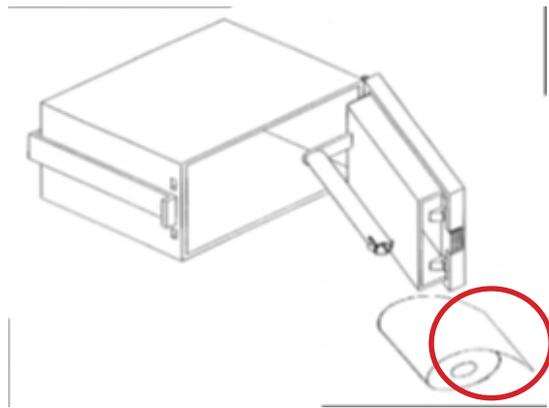
The printer is mounted in the top cover.

MPP537X Printer Models



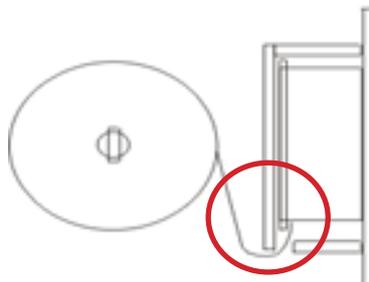
Installing Replacement paper

- Open the front panel
- Remove the empty paper centre roll tube of the old paper roll
- Slide the new roll over the paper roll support until it is held by the clips
- Cut off the end of the paper cleanly with scissors
- Feed the cut edge of paper up into the printer mechanism and operate the paper feed button.



Cut off the end of the paper cleanly with scissors

Paper Roll Path



Feed the cut edge of paper into the mechanism and operate the paper feed button

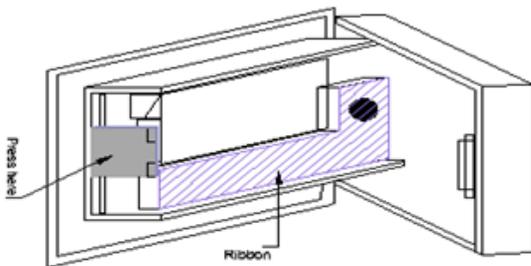
CHANGING PRINTER RIBBON

Paper loading problems

Incorrect paper loading causes many expensive service call-outs. Please ensure that the paper loading method described here is used. Do not tear-always cut the paper with a sharp pair of scissors- a likely cause of problems is the introduction of paper fragments produced when paper is torn.

For best operation and reliability use only Astell Scientific paper and ribbons.

- Remove paper from the printer
- Open the printer front panel
- Press in on the plastic tab shown in the view below. This releases the two halves of the front panel so that the front cover can swing away from the printer itself
- The printer ribbon is the small black I-shaped cassette that sits below the paper inlet slot
- Grasp at both ends and pull firmly away from the printer assy



- Hold the new ribbon cassette by the ends and rotate the small wheel using the tip of a biro pen in the direction shown by the arrow on the cassette. This tensions the ribbon
- Place the new ribbon cassette in position on the mechanism. Press the larger end with the wheel down gently until the clutch engages then press the other end down until seated correctly
- Press paper feed for 5-10 seconds to align the ribbon in the slot. The ribbon should run neatly in the slot provided. If the ribbon is distorted and above the slot, remove, retention the ribbon and replace
- Re-load the paper

OPERATION OF PRINTER

Please note that the print is not visible immediately after printing since the point at which the printing occurs is a few mm inside the case and hence may be out of view.

Printing is automatic whenever it is required by the program.

Cycle Progress is printed automatically as the cycle runs.

All relevant events are printed such as:

- Start information, cycle selected, cycle details
- Temperatures pressures and times etc.
- Cycle number
- Stage changes
- Manual stage changes or operator intervention
- Faults if and when they occur
- Completion details and time etc.

Printer paper feed

Press the paper feed button provided on the printer.

This is also useful to check that the paper is feeding properly.

Paper tear-off

Press the paper-feed button to move the paper end up.

Hold the end of the paper firmly and pull gently at right angles towards the edge of the paper slot with the sharp teeth, to tear the paper

Do not pull the paper straight out of the printer.

PRINTER PROBLEMS

Most printer faults are due to the paper or ribbon being incorrectly installed or use of incorrect paper or ribbons.

- **Printing feint**
Replace printer ribbon, or print head fault
- **Printer moves but no printing**
Replace printer ribbon
- **Printer head and paper moves but no printing on some or all columns**
If ribbon is ok, print head worn out. Repair required.
- **Centre of print blurred or missing**
Ribbon incorrectly installed with ribbon twisted up out of slot in centre ribbons must be fitted with the ribbon correctly seated in the slot.
- **Paper will not load**
The paper end must be cut cleanly at the end or it may tear, jam, and clog the printer mechanism ensure paper roll is fitted correct way up.
- **Oversize paper**
Use only Astell supplied or Astell approved paper. Alternatives may appear similar but poor paper quality can damage printer or use up ink on ribbon too quickly.
- **Printer head does not move**
Fragments of torn off paper jammed in printer. Turn off power. Carefully remove with tweezers and turn back on.

PRINTER SPARE PARTS

Warning! **Non-Astell paper rolls**

Paper rolls purchased from other suppliers, e.g. for adding machines and tills are not suitable and usually slightly too wide. They can stick and tend to shred paper fragments into the mechanism and cause premature failures. This may produce printing which is cramped vertically or with white stripes across the print.

Part	Astell part number
Paper	SXP374
Ribbon Cartridge	SXP373
Contact Astell service department or approved agent for a quotation.	

PRINTER WARRANTY

Installation of paper to the printer is outside the manufacturer's control.

Incorrect paper installation, damage caused by torn paper fragments and foreign bodies, damage caused by bad installation of ribbons or physical damage to the case or mechanism by the user whilst installing ribbons or paper are not covered by the warranty.

Service calls during the warranty periods which (in view of the manufacturer or agent) are caused by the user and/or these reasons may incur service charges.

MAINTAINANCE AND CLEANING

STERILISER CLEANING

Water quality and a clean chamber are vital to the correct operation of the system.

The chamber and all wetted parts should be cleaned regularly in order to maintain adequate operating conditions. Load containers should be chosen to minimise loss of the contents into the steriliser, e.g. ideally do not use plastic bags inside steriliser baskets but use a purpose-made steriliser container designed to catch leaking waste. Please ask your supplier for details of containers for your machine.

CHAMBER CLEANING

The chamber should be cleaned internally to prevent build-up of contaminants, and we would suggest that for a machine in daily use. The chamber should be checked once a week and cleaned if necessary. For other applications cleaning should be at monthly intervals or more frequently if needed.

- Open the door as normally
- Remove all trays or shelves
- Clean the base of the chamber with hot water. Do not use an abrasive cleaner or one which may leave soluble residues that would remain in the pipework and contaminate the water
- Take care not to damage the sensors, or to displace them in any way
- Wash the sensors with hot water and a soft cloth. Rinse if required with clean warm water
- Dry the chamber with paper or cotton towels. Do not leave fragments of paper or lint behind
- Wipe the gasket with a wet cloth moistened with a little detergent
- Do not use chlorine bleach cleaners inside the stainless steel chamber. Water and detergent should be used to wash the chamber out when required, and a "scotchbrite" scouring pad may be used carefully. Do not damage the gasket or the gasket mating surface

Limescale in chamber

Where limescale has built up you may use an acid-free kettle descaler or bathroom limescale remover type of product to dissolve the limescale but please ensure this does not contain bleach.

CABINET AND GENERAL CLEANING

- **Cabinet stainless steel and painted surfaces:**
The cabinet surfaces may be cleaned with a damp cloth moistened with water and a little household detergent or detergent based non-bleach spray cleaner
- Do not use abrasives or chlorine-based cleaners or bleaches on the cabinet or chamber and do not spray cleaners directly onto cabinet surface
- If stubborn marks persist use a soft cloth moistened with a very small amount of methylated spirits. Do not use IPA or similar solvents or aqueous cleaners, as these will damage the transparent window
- **Touchscreen and control panel:**
Clean with a cloth moistened with a little water. Alternatively you can use spectacle cleaning wipes suitable for plastic lenses
- **Labels** (e.g. on panel work) for printed labels on the panels wipe gently with a cloth moistened with a little water and optionally a spot of detergent. Do not rub hard, use solvents or abrasives or you will destroy the printing
- **Working parts** to clean, steel, brass, aluminium parts etc., or other working parts use a soft cloth moistened with "WD40" or "duck oil" or similar. If that is not available, use a little white spirit / turpentine. Do not use other solvents such as IPA (rubbing alcohol), or strong aqueous cleaners

SAFETY AND DOOR INTERLOCKS

This steriliser is fitted with safety interlocks to prevent the opening of the cover when the chamber is pressurised, and to prevent pressurization if the cover is not fully closed.

The UK Health and Safety regulations stipulate that the closure system and interlocks shall be inspected at regular intervals by a competent person, and that all operators shall be trained in the use of the steriliser controls, operating procedures, and the function of safety devices.

Door interlocks

The door is held in the locked position by an electrically retracting solenoid locking pin. This is fitted with 4 sensor micro switches arranged to enable the heating and control system only when the door is closed and the handle rotated into the locked position. With the cover open or not fully locked heating is disabled. The locking bolt system is continually monitored by the control system.

Inspection and checking

- Unlock and open the door
- Check for smooth action with no grating or crunching noises, or looseness
- Inspect the locking pins they should slide freely as the handle is moved
- Operate the door handle. Observe the operation of the bolts. Operation should be firmly limited by the end stops, and all bolts must operate in the same manner. Check that solenoid locking pin operates when handle is in fully locked position
- Close door and hold shut do not lock. Display should change to "unlocked"
- Rotate handle, lock and check that locking functions correctly and prevents further movement of handle. Display should show ready to start
- Use [door] button to unlock
- If the displays show out of sequence, are unreliable, or do not show, or if the machine does not lock correctly turn off and consult a qualified engineer immediately
- In the UK HSE guidance note PM73 requires that such checks are carried out regularly. To comply with HSE requirements, instructions regarding testing of these interlocks must be permanently displayed close to the sterilizer operator position

OVERTEMPERATURE PROTECTION

This system is intended to protect the chamber, controls, and, the load, from thermal damage but may not prevent the water heaters from damage due to overheating.

The system uses an adjustable hydraulic thermostat set to about 250°C with the adjustment knob sited at the back of the cabinet behind a cover. The thermostat has a sensor bulb mounted in a clamp on the heater at the rear of the chamber. In the event of a temperature rise for any reason above the set temperature the thermostat operates, this provides additional boil-dry protection.

There is also a snap-switch cut-out which requires manual resetting that operates in the extremely unlikely event that the chamber wall exceeds approx. 150°C if this cut-out operates there is a serious fault and the chamber will not heat and must be serviced or repaired by a qualified engineer.

WARNING!

The manufacturers of this steriliser accept no responsibility for damage which may result in a load processed in this steriliser in the event of an overheating fault occurring for any reason. The over temperature cut-out is provided to reduce the risk of fire or consequent damage.

EMERGENCY UNLOCKING

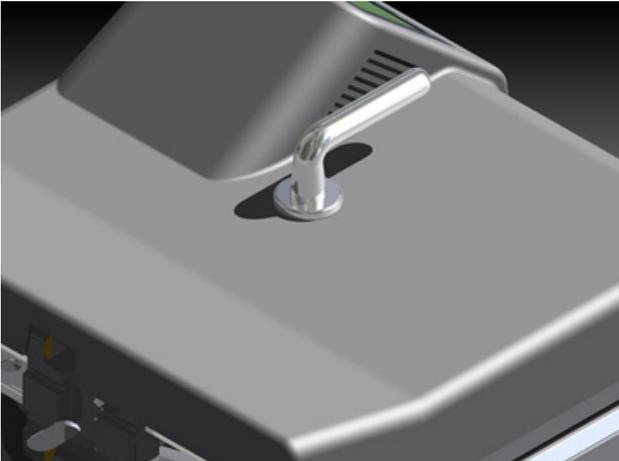
If the door becomes jammed, or in the case of a power failure, the door can be manually unlocked.

Warning! The chamber must be below 50°C and pressure on dial gauge must be zero.

MANUAL UNLOCKING

Sizes 60 litres and below

Picture A

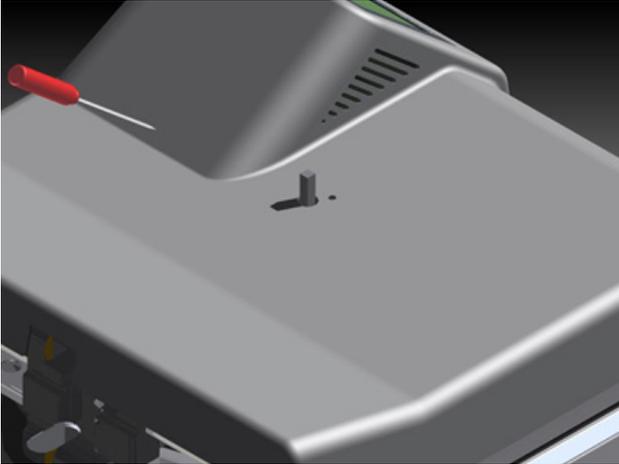


Picture A

Undo handle

- Loosen the screw at side of handle using an Allen key.
- Remove handle cover
Gently prise off the plastic cover surrounding the base of the handle.
- Remove handle retainers
Undo the 4 screws holding the d-shaped plastic handle retainers to the cover.
Separate the two d-shaped parts.
- Remove handle
Pull the handle off the square shaft.
Note the orientation to make refitting easier.
This will expose the unlocking hole beside the handle shaft.

Picture B

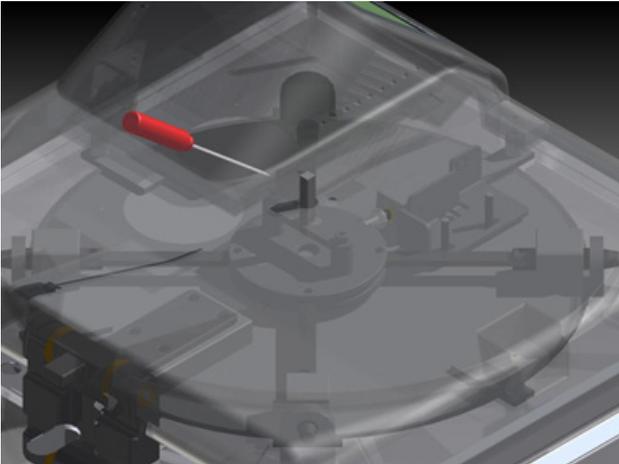


Picture B

Unlocking tool

You can use a long thin screwdriver - with a blade 3mm x 150mm long.

Picture C



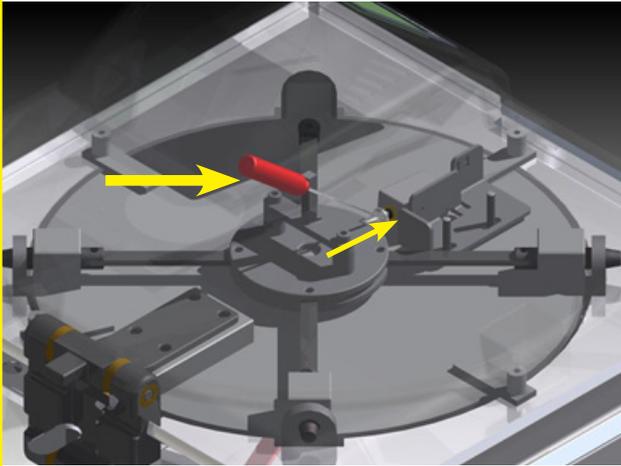
Picture C

This picture shows the top cover as if it was semi-transparent.

- Insert tool

Hold the tool at the angle shown. Insert it carefully into the hole, holding it straight so that it points toward the front edge of the door.

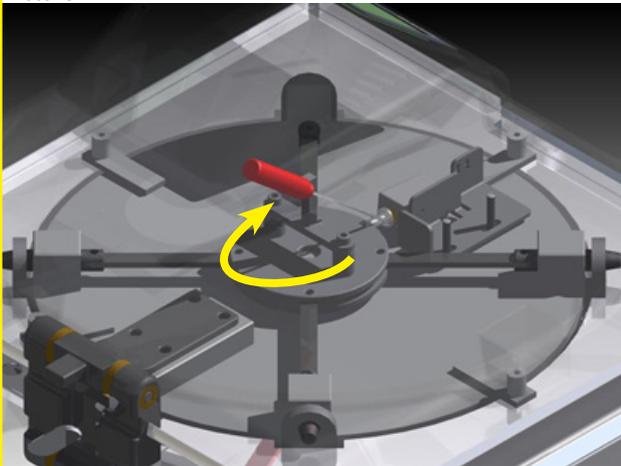
Picture D



Picture D

- Push the tool gently into the hole until it engages the end of the locking bolt.
- Holding the tool, carefully refit the handle loosely onto the square drive shaft so you can rotate the shaft by turning the handle.

Picture E



Picture E

- Push further against the spring-loaded bolt. This will push the bolt out of engagement.
- Turn the handle clockwise to unlock.
- You can either place the handle loosely on the end of the square shaft or use a spanner to turn the square shaft.

MAINTENANCE

The European PED and many similar regulatory regimes require the user to set out and comply with a formally agreed maintenance procedure.

This information is provided in good faith to assist this process but it is the user's responsibility to ensure that all statutory regulations are complied with.

PERIODIC MAINTENANCE

There are very few moving or wearing parts in these sterilisers, however, it's essential that the unit is kept clean, especially chamber and the gasket.

Clean out chamber **weekly** and inspect for damage to sensors etc. Drain if water is contaminated.

Maintain the following in every 3 months

- **Safety valve testing**

Astell Scientific advise that the safety valve should be regularly tested at 3 month intervals. The controller will warn you on screen when this is needed. This can be changed if required to suit local pressure vessel regulations.

In the UK Health and Safety Legislation requires that this is carried out at intervals not exceeding 3 months.

See "safety valve testing" section

- **Gasket**

Keep the mating surface of the chamber flange clean. This bears on the gasket to seal the chamber if necessary apply silicone grease. Check that gasket is not bulging out of the groove and, that the edge is smooth without any cuts or abrasions.

Check that the gasket is fitted correctly - the small holes (4) should be on the outside lip.

Replace gasket regularly. Astell advise that the gasket is a wearing part and will require replacing at 12 month periods or 6 months if the machine is used intensively or for many high-temp cycles.

- **Clean chamber**

Clean out chamber and inspect for damage to sensors etc.

- **Door interlock tests**

Carry out the door interlock test described on previous pages. If necessary lubricate locking pins with disulphide high-temp grease.

THERMOCOUPLE ACCESS PORTS

A screwed thermocouple access port is provided as standard for testing thermocouples. This comprises a hexagonal thermocouple port cover cap which screws onto a male fitting. There are slots in the sides of the male fitting to allow the wires to emerge under the cap. The cap clamps a 12mm silicone seal against the hole in the male fitting. The seal deforms around the thin thermocouple wires.

Front-load models:

The port is fitted at the left-hand side of the machine approx. on the boiler centre line (remove the small cover for access).

Top-load models:

The port is fitted at the right-hand side of the machine on the boiler side. Remove the small cover for access

Inserting thin-wire thermocouples:

- To insert test thermocouples in the fitting release the cover-cap nut and remove the seal
- Pass the thermocouples through the split seal and out one side slot
- Fit the cover cap nut and tighten to seal
- Ensure that the thermocouples are not damaged when screwing on the cap nut

LOAD SENSING PROBES

Sensor sockets are provided connected to the chamber and/or load sensing probes, close to the port for the armoured flexible probe.

Fitting replacement probes

The flexible armoured probe has a short rigid tube at the chamber wall end. This is fitted through a threaded compression fitting in the chamber wall.

Remove the appropriate cover or side panel from the cabinet to give access to the probes. Locate the load sense probe fitting.

Hold the probe fitting and loosen the compression nut (outside of the chamber on front-loaders, inside on top-loaders). The compression olive will be compressed hard onto the armoured probe tube-end, and this means that the old olive must be replaced with new items every time the probe is changed. This is Astell part no SER014 (top loader).

The probe is installed by passing the wires first and then the end-tube through the compression nut and olive and then through the fitting. Tighten the nut finger-tight, and then tighten further with a spanner.

DO NOT pull on the cable to drag it through the fitting or damage the insulation on the inside of the fitting. The sleeved part of the wires should be inside the fitting to act as a cushion against abrasion.

A little silicone joint compound may be smeared onto the tube and the olive, but do not put silicone sealant on the compression nut, threads or on the wires through the fitting.

Probe connector arrangements

The probe is supplied with red and white wire ends for the PT100 internal connections.

Make a note of the existing connections.

Ideally order a new set of contact pins with the new probe. Use the pin extractor to push the pins out of the plug plastic moulding. Solder the wires to the new pins and insert into the plug moulding in the same places as the old ones.

You can alternatively cut off the old probe wires 50 mm from the plug body and strip back 10mm of wire, and re-solder the new wires to the old wires. Insulate the joints with tape or sleeving.

Load Sensing Probe parts

Part	Astell part number
Load Sensing Probe	361103
Pins	XXA391
Plug body	XXA464
Pin extractor	ZXD434
Complete kit	AAN014BR
Compression olive (front-loader)	Consult Astell
Compression olive (top-loader)	SER014

COMMISSIONING AND PROGRAM SETTING

This section describes how to derive the settings that you may need to enter for your intended program(s). The description applies to discards loads but a similar approach can be applied to instrument/glassware.

A "program" consists of three process sections plus cool lock settings. Any of these are independently selected and adjustable.

- Free steaming at 95°C forces the air out from the chamber
- Sterilising at set point temperature for selected time
- Cooling locks set temperature

The program values can be determined by trial-and-error, but as this can be very long and involved, it is best to use a chart recorder to investigate the temperature - time behaviour of the load. A number of settings must be made.

Free steaming

The free steaming time depends on the nature of the load. Items such as trays or racks, solid items, bowls, etc. have low thermal mass and do not trap much air, and will sterilize quite satisfactorily with minimal, typically 5-7 minutes of free steaming time. However, larger loads with larger boxes of bottles, phials, petri dishes, etc. Have a larger thermal mass and trap a great deal of air. These are always needed a longer free steaming time. The free steaming time should be set to give at least 3 minutes of active free steaming.

Insufficient free steaming causes excess pressure in the chamber for the temperature, and a higher peak-peak fluctuation in temperature which will trigger the chamber (or load) temperature fault alarm.

Determining suitable sterilize and air-purge times

The chamber will heat-up to sterilise temperature before the load catches up, and this time delay must be accounted for to ensure correct sterilisation.

The load sensed timing option (if fitted) compensates for the time-lag automatically and only requires the sterilising time to be entered.

If the time-lag for the load to catch up with the chamber is known from another machine, or can be adequately estimated then this may be added to the desired sterilising time and the total set as the sterilize time for the program.

In most cases the behaviour of the load in this arrangement is unknown, so it is necessary to use a chart recorder or multi-thermocouple indicator to monitor the load, and find the ideal free steaming and sterilise times.

Use of a temperature recorder or data-logger for commissioning measurements

Arrange a multi-pen thermocouple chart recorder or indicator to monitor the temperature in the load and in the chamber. For a complex load, the steam penetration is the slowest into the more enclosed parts, such as the centre of stainless steel buckets. In this case, the very centre of each container should be monitored with the sensor inside a load item (e.g. a petri dish). Other points throughout the load may be monitored depending on how many thermocouple sensors are available. If desired sterilising monitor tapes or spore strips may be distributed throughout the load.

Load sensing option

The process to determine the time settings differs if load sensed timing option is fitted and selected. If it is available on your machine, you must decide whether it is necessary or desirable to use it or to select the simpler timing system. You should choose to use this if the heat up time of the load may vary from cycle to cycle, e.g. if the size of loads varies widely.

FREQUENTLY ASKED QUESTIONS

Q: Screen contrast low.

A: Screen contrast is adjustable in the system info page.

Q: RCD earth leakage trip we have installed for the machine keeps tripping out.

A: The type of heater used in this machine means that operation from a RCCD residual or earth-leakage trip may cause tripping problems. This may occur especially if the machine is not operated for some time and is due to moisture ingress to the Inconel-sheathed heaters. If this happens connect to a non-protected supply and run for 5-10 cycles. Then revert to protected supply. If the tripping then continues please consult the manufacturer.

Q: Why can I not fast-exhaust the steam when I want to?

A: This action would however probably be dangerous and could be in breach of health and safety legislation. Firstly the amount of steam produced when a chamber pressurised to 121°C is exhausted is very large and constitutes a serious hazard. Unless special high temperature exhaust pipework is installed in the building to take this exhaust away to a safe discharge, then this would be unsafe. If the load being processed contained any fluids then the action of exhausting the steam from 121°C would cause the entire fluid load to flash-boil. This would cause the load to violently boil over and empty the load contents into the chamber, which quickly will "gum-up" the valves and pipework. Also if such a load was removed even after it had appeared to stop boiling over then it would be very likely to flash-boil again into the face of the user carrying the load.

Q: I have filled the chamber up with deionized water and the unit does not work.

A: Please use the correct type of water - not deionized or distilled. See filling with water section.

Q: Locked the handle with door open.

A: Press the door button and rotate the handle to the unlocked position

Q: Power on at wall but display dead.

A: Check that the power switch is illuminated or for rotary switches in on position. Check that the unit is plugged in and there is power available at the mains socket. If these are all ok call a service engineer.

Q: Difficult to close door against gasket (1).

A: This could be trapped air expanding. If chamber is still very hot allow it to cool down and try again.

Q: Difficult to close door against gasket (2).

A: If gasket is more than 6 months old consider a replacement.

Q: Steam leaks from around Gasket (1).

A: Gasket must be fitted correctly into groove and must have no damage to the edges of the lips or cuts or abrasions. The opposite sealing face that it touches must be clean with no cuts or damage.

Q: Steam leaks from around Gasket (2).

A: Possibly gasket needs replacing. It must be replaced before the silicone rubber loses its sealing properties. Any time after six months of use.

Q: Gasket changed but steam leaks.

A: Gasket must be fitted correct way round. There are four small holes on the gasket lip. These must be on the outside edge.

Q: Programs not suitable for my loads, that are provided pre-set as delivered.

A: Consult the sections on selecting times, temperatures, etc., then in supervisor level follow the instructions in the programming manual and enter the new values you require.

Q: Delayed start would be useful / is not required.

A: Turn on or off delayed start. See programming manual.

Q: Forgotten the password.

A: The default numbers are operator 111111, supervisor 222222, site engineer 333333. If in doubt consult Astell.

Q: "Safety test overdue" appears.

A: You have not carried out a safety valve test. See "safety valve testing" section.

Q: My Printer does not print properly.

A: See printer faults in the "optional printers" section.

Q: How do I clean the machine?

A: See "maintenance and cleaning" section.

Q: Unlock the door in emergency.

A: Please see the photo-instructions in the section "manual unlocking".

Q: Machine needs to be calibrated.

A: You will need a calibration organisation that can carry out the appropriate tests with known calibrated thermometers and pressure gauges. Astell Scientific or your agent will be able to assist, and Astell provides a separate manual on calibration.

Q: System starts to heat immediately without taking any water and the heating is unstable.

A: The water level sensor in the chamber is damaged or contaminated. See faults section "water level sensors".

STERILISATION PARAMETERS FACTORY SETTINGS

CLASSIC

PARAMETER	Classic Instrument	Classic Glassware	Classic Discard	Classic Fluid	Classic Media
Printer*	ON				
FREE STEAMING					
Monitor time	60 min				
Hold time	5 min				
Print interval	1 min				
Limit pressure	1200 mbar				
Start temperature	95°C				
HEAT TO STERILISE					
Monitor time	90 min				
Print interval	5 min				
Stabilize time	1 min				
STERILISE					
Monitor time	90 min				
Print interval	1 min				
Sterilisation temp.	121°C				
Sterilising time	15 min				
Probe chamber**	121=Y	121=Y	121=Y	121=Y	121=Y
Probe load	0=N 121=Y	0=N 121=Y	0=N 121=Y	0=N 121=Y	0=N 121=Y
COOLING					
Monitor time	90 min				
Print interval	5 min				
Cool fan delay	2 min				
Cool time	15 min				
Cool override time	20 min				
Cool temperature	80°C				
Cool interlock	Yes				
Start temperature	105°C				
Cool pressure 1	1200 mbar				
Cool pressure 2	1300 mbar	1300	1300	1300	1300
Cool pressure 3	1050 mbar				
Cool 1	Yes				
Cool 2	No				
Hold warm***	No				
Temperature	80°C				
DRYING					
Monitor time	N/A	N/A	N/A	N/A	N/A
Hold time	N/A	N/A	N/A	N/A	N/A
Temperature	N/A	N/A	N/A	N/A	N/A

Cells without entry are the same as in column 2 (classic instrument).

* Off if not required, when fitted.

** Same as sterilise temperature.

*** Requires hold warm to be enabled in settings/system/door, hold warm.

SPARE PARTS AND SERVICE

When ordering spare parts or requesting service assistance please have ready the serial number and the model number - both of these to be found on the rating plate fixed at the rear of the machine.

Use only approved Astell Scientific spare parts, available from the Astell service department. The fitting of non-Astell approved parts will render this machine non-compliant with the E.C. / E.U. E.M.C. and L.V. and the P.E.D. directives and will void any CE mark.

Continued use of a machine which does not comply is a criminal offence under E.C. / E.U. law.

Spare parts list

For any items not appearing here consult manufacturer or supplier.

Part Description	Part No.
Heater 2.3 kW 230V for front load 23,35L	880024
Heater 3kW 230V /2.6kW 208V for top load 50-60L	ZXA839
Heater 2.6kW 230V for frontload 50L	ZXA852
Door gasket 35L/50L issues and specs. of gaskets are colour coded - please specify original colour at time of order	389083
Door gasket 23L -see note above re colour	384085
Locking solenoid 12V	SXQ214
Handle assembly (plastic)	PXC030
Solenoid pin sense micro-switch (small/ long lever)	SXQ598
Door bolt detect micro-switch	SXS212
Pressure gauge	RXA263
Solenoid valve 24 V	FXA422
Water level insulator assembly (through-chamber fitting)	SXA070
Water level sensor strip (internal)	389066
Safety valve 3/8" safety valves are region and specification dependant - please contact supplier for details.	Consult supplier
Fuse 1A HRC(power)	SXQ333
Fuse 1A HRC (power) USA only	SXQ304
Fuse 16A HRC (power)	SXQ305
Fuse 20A HRC (power) (some models only)	SXQ303
Over temperature cut-out thermostat 0-300°C	SXL503
Over temperature cut-out snap switch 150°C man-reset	SXQ308
Heater solid-state relay	PLC670
Door closed micro-switch	SXS210
Membrane touchscreen surround	Consult supplier
PT100 sensor assembly Requires also a ¼" olive to fit, part no. SER042	DXE364
Load sensor probe (armoured) Requires also a 5/16" olive to fit- part no SER014 (top loaders only)	361103
T/C probe entry adaptor (normally fitted as standard)	Consult supplier
Secure touch colour display-control system	Consult supplier
Power supply, or PLC input-output modules	Consult supplier
Pressure transducer / transmitter 0-4 bar	PLE004
Oil free linear pump	PMP041
Biological filter	ZXA410

CERTIFICATION

A Certificate of Examination is supplied with every steriliser. This meets P.E.D requirements and includes details of chamber etc. relating to the pressure vessel, specifies the design pressure, the test pressure to which the chamber was subjected during manufacture, and the date of the pressure vessel testing , which will be required by an insurance company.

Please note that this equipment comes under the requirements of the CE Pressure Equipment Directive and your machine will certainly need insurance cover and regular inspections. Most QA systems require a formal maintenance contract in place and regular calibration must be carried out.

It is a statutory requirement of the U.K. Health and Safety at Work Act and in many other countries that sterilisers be thoroughly inspected by a competent person prior to use (usually an Engineering Surveyor from an Insurance Company) , and at least every 14 months thereafter. (Section 35(5) of the Factories Act 1961.)

The information on the Test Certificates will be required by the inspector, and you are advised to take good care of your Certificate.

Test certificates for Electrical safety and Calibration of the control system are supplied as standard, full test analysis results are available to special request.

PRESSURE TEMPERATURE CORRELATION CHART

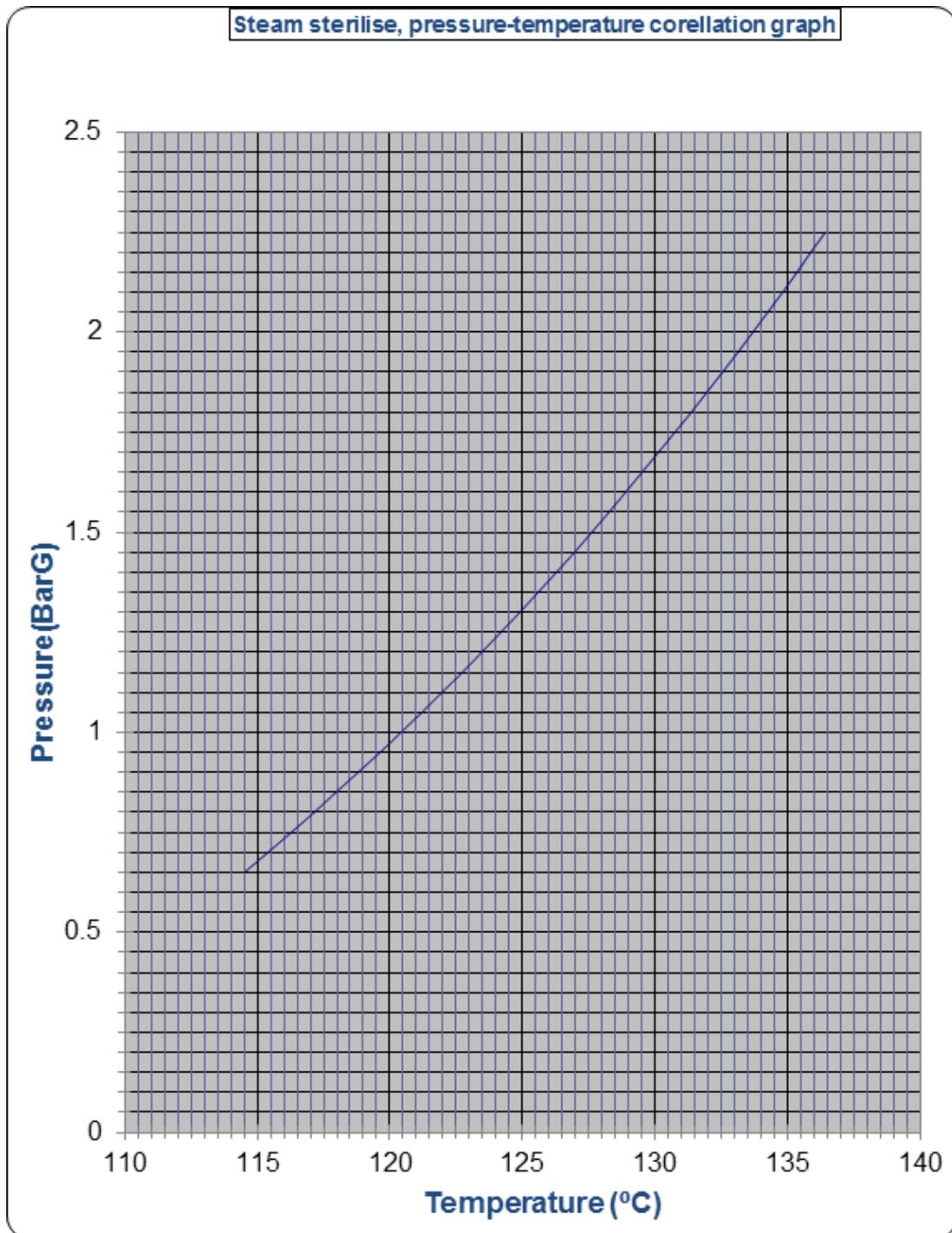
Pressure/Temperature Calibration

This chart shows Pressure and Temperature correlation for Saturated Steam, and the Maximum/Minimum acceptable Temperature display Values for a Correlation Accuracy of +/- 2%. It applies to Astell sterilisers only.

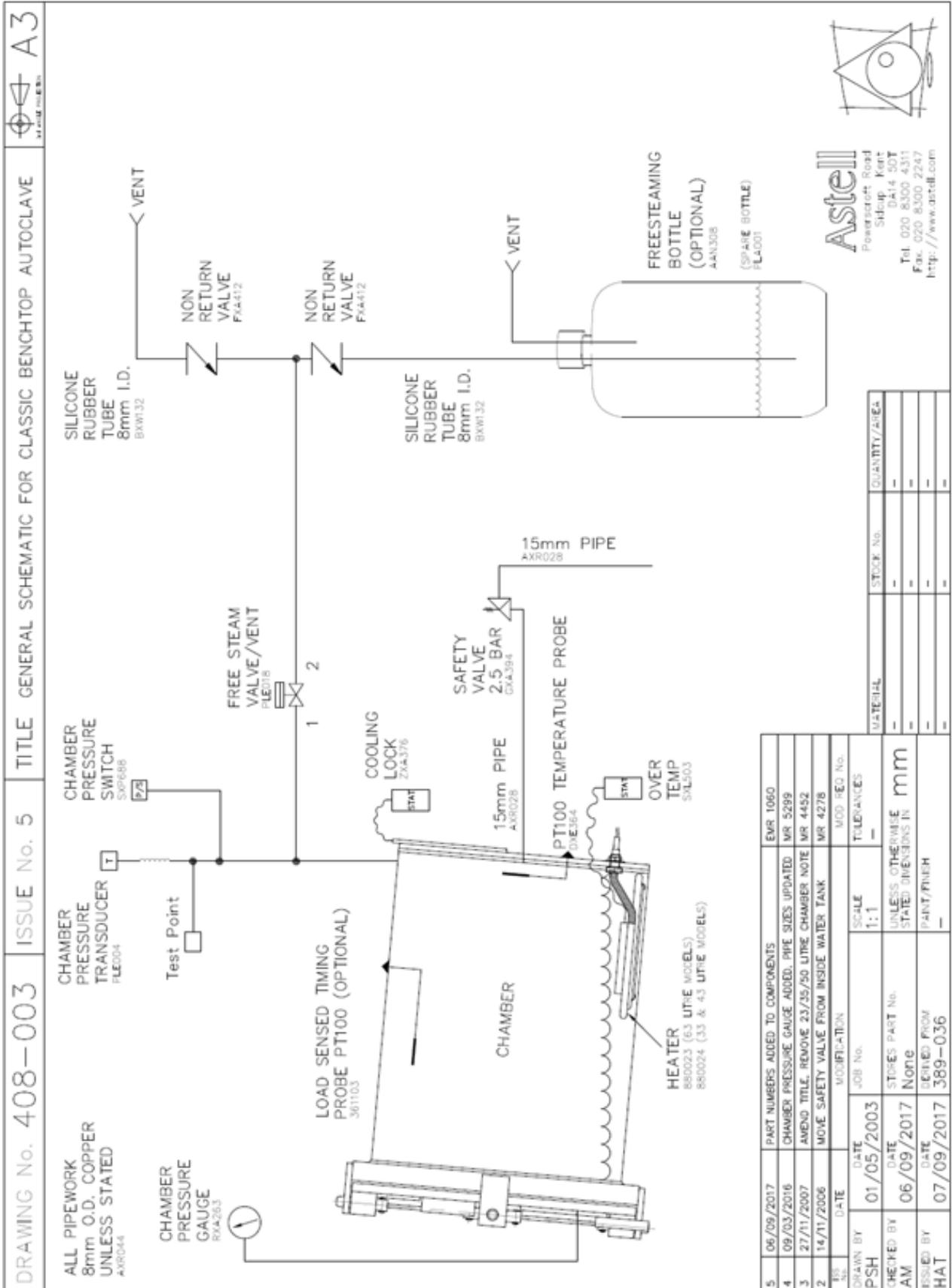
Pressure Bar	Temperature °C	Temperature Min. temp.	Temperature Max. temp.
0.65	114.51	112.22	116.80
0.70	115.40	113.09	117.71
0.75	116.28	113.95	118.61
0.80	117.14	114.80	119.48
0.85	117.96	115.60	120.32
0.90	118.80	116.42	121.18
0.95	119.63	117.24	122.02
1.00	120.42	118.01	122.83
1.037	121.00	118.58	123.42
1.05	121.21	118.79	123.63
1.10	121.96	119.52	124.40
1.15	122.73	120.28	125.18
1.25	124.18	121.70	126.66
1.30	124.90	122.40	127.40
1.35	125.59	123.08	128.10
1.40	126.28	123.75	128.81
1.45	126.96	124.42	129.50
1.50	127.62	125.07	130.17
1.55	128.26	125.69	130.83
1.60	128.89	126.31	131.47
1.65	129.51	126.92	132.10
1.70	130.13	127.53	132.73
1.75	130.75	128.14	133.37
1.77	131.00	128.38	133.62
1.80	131.37	128.74	134.00
1.85	131.96	129.32	134.60
1.90	132.54	129.90	135.19
1.95	133.13	130.47	135.79
2.00	133.69	131.02	136.36
2.05	134.25	131.57	136.94
2.10	134.82	132.12	137.52
2.15	135.36	132.65	138.07
2.20	135.88	133.16	138.60
2.25	136.43	133.70	139.16

Note: This chart is for checking Pressure/Temperature Steam Correlation only and is appropriate for Press/ Temp. Instruments specified as individually accurate to +/- 1%. It should not be used as a calibration standard for Pressure or Temperature indicators, which must be calibrated in accordance with the Manufacturer's Specifications.

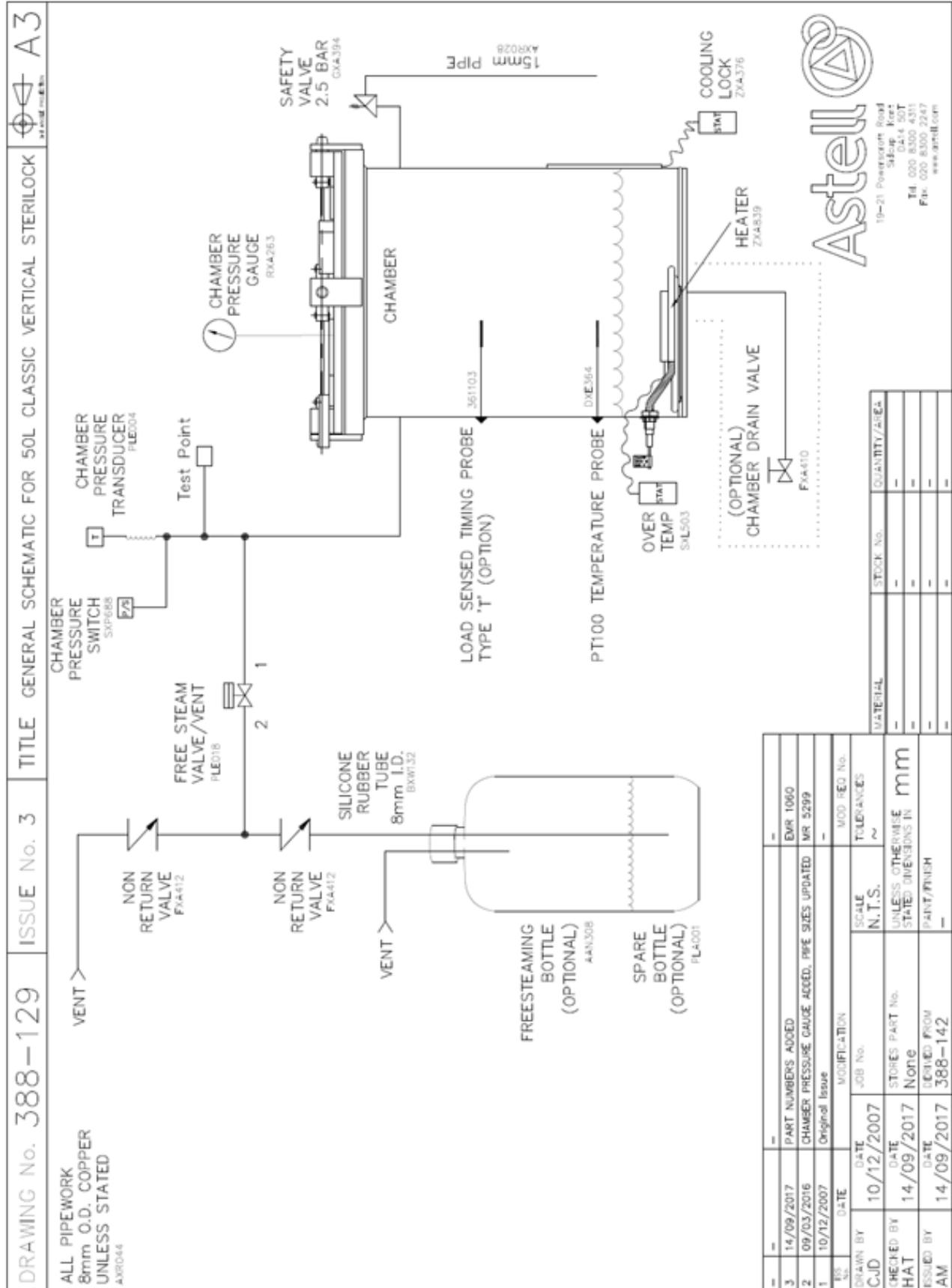
PRESSURE TEMPERATURE CORRELATION GRAPH



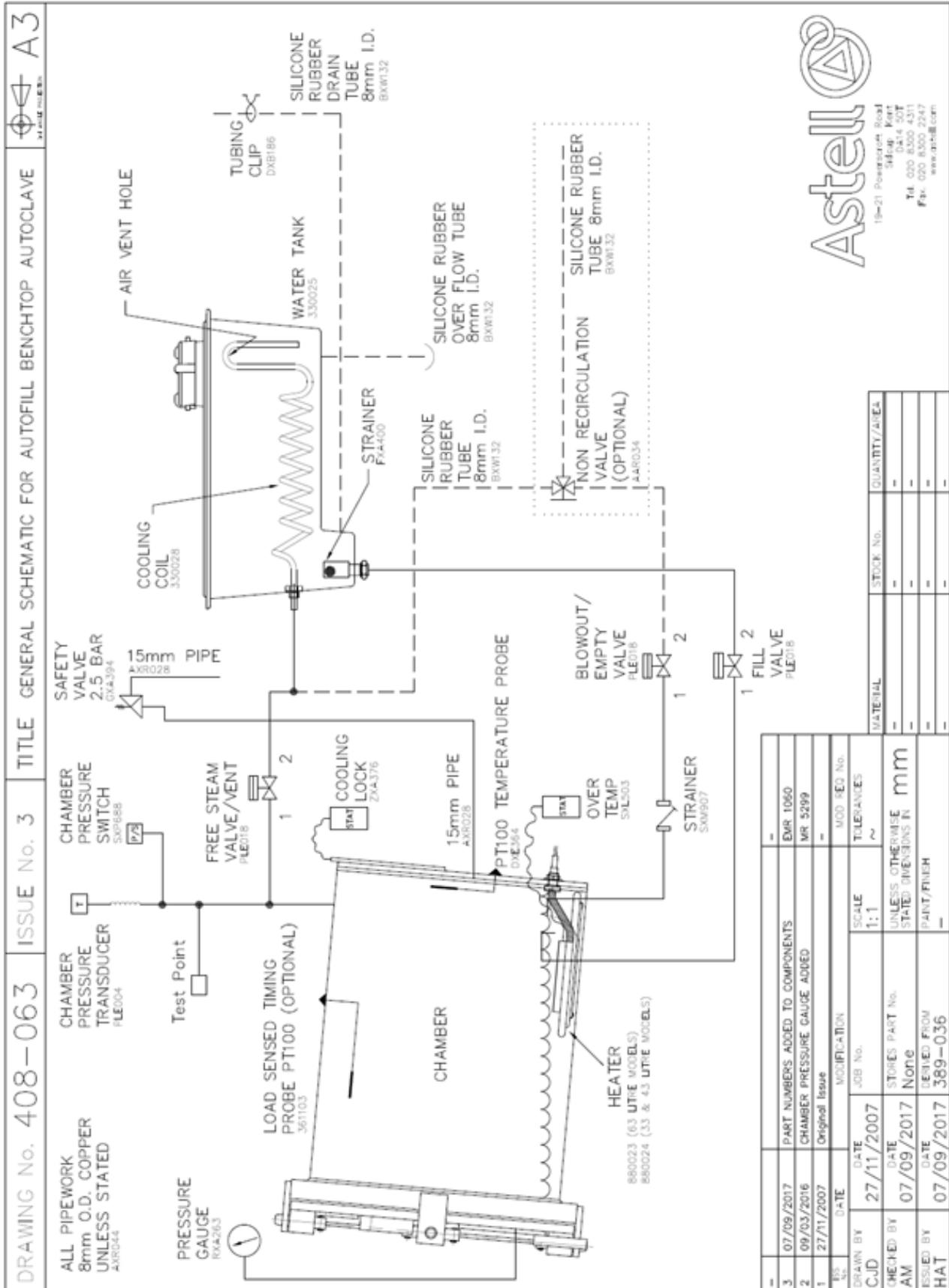
GENERAL FLOW DIAGRAM SCHEMATIC CLASSIC FRONT LOADER



GENERAL FLOW DIAGRAM SCHEMATIC CLASSIC TOP LOADER



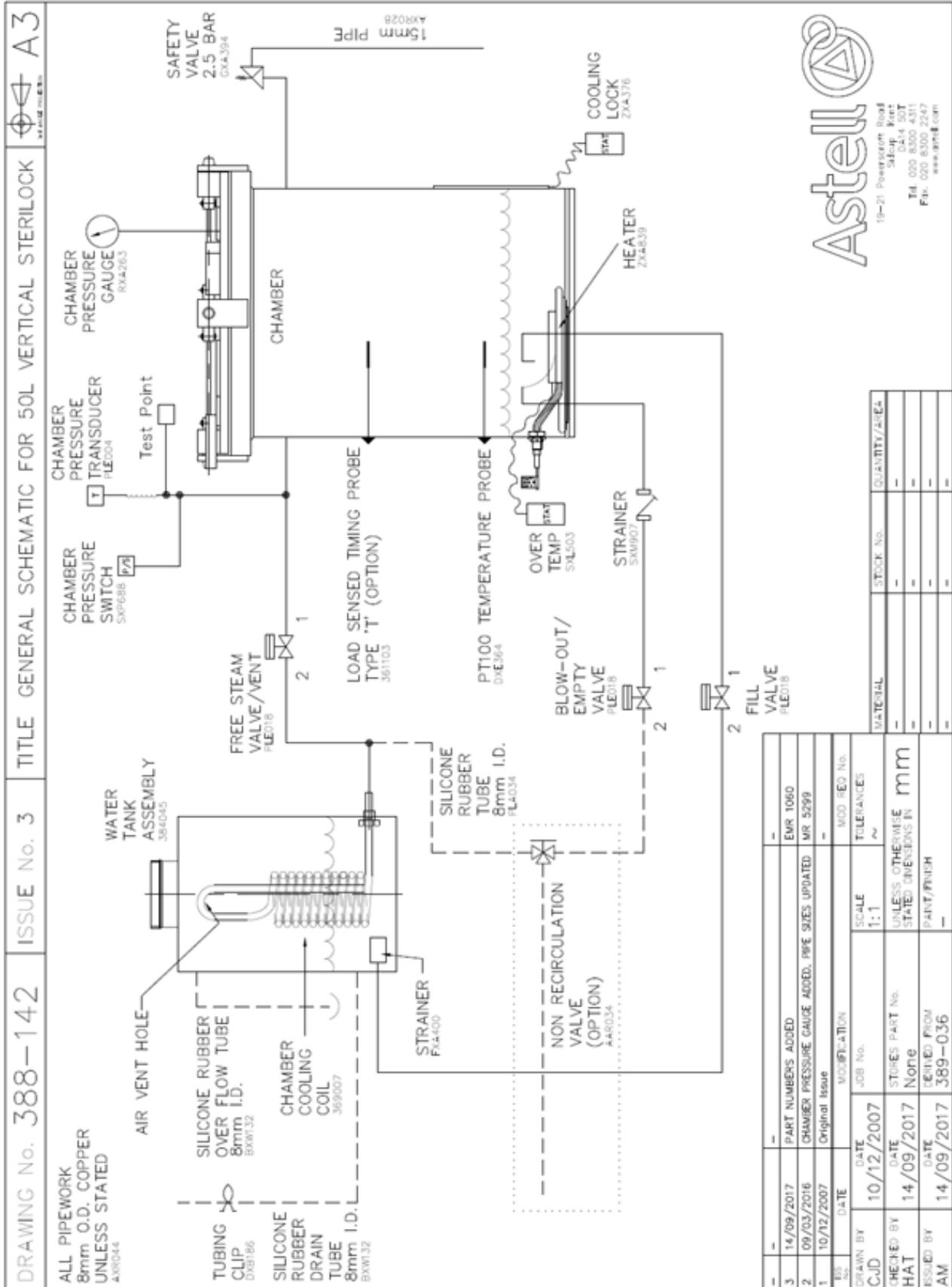
GENERAL FLOW DIAGRAM SCHEMATIC AUTOFILL FRONT LOADER



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GENERAL FLOW DIAGRAM SCHEMATIC AUTOFILL TOP LOADER



NOTES SPACE

This space is for your own notes on the system



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