MXN276

Swiftlock Autoclave

80 to 300Litre
Top and Front Loading

Programmable Control System

4 LINE DISPLAY CONTROLLER

PROGRAMMING INSTRUCTIONS

OPERATING INSTRUCTIONS

PRINTER OPTION INSTRUCTIONS

CONFIGURATION AND ENGINEERING SYSTEM INSTRUCTIONS

INSTRUCTION MANUAL

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See also Astell Scientific Manual Part No MXN275(orMXN498)

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Software Issues NSW418

CONTENTS

SWIFTCLAVE MULTIPURPOSE STERILIZER PROGRAMMABLE CONTROL SYSTEM

This manual details the Programmable Controller used in this range of Multi-Purpose Sterilizers. Programming and Controller Operation are covered here but this manual does not advise on day-to-day operation of the Sterilizer itself , setting up for different loads , Loading arrangements, Safety or Sterilizing advice .

Installation Instructions, Operating Instructions , & Maintenance Instructions are provided in A separate Instruction Manual

Control System

The Sterilizer is provided with a control system comprising a Keyboard and Illuminated Liquid Crystal Display. An optional Internal or external printers may be mounted in the control pod, on the cabinet or freestanding, to record the Sterilization Cycle progress.

Optional Remote Freestanding Chart Recorders and the Astell 'AutoScribe' Datalogger are available matched to the control system to provide independent evidence of sterilizer performance. These are controlled to run automatically within each cycle.

Instructions for Datalogger & Recorders themselves are covered in additional ASTELL Manuals and Original Manufacturers Manuals supplied with the equipment .

MACHINE SPECIFICATION AND CONTROL OPTIONS

The Control System Display MAY show various items of information when the Mains Power is turned on , for example...

"SWIFTCLAVE CLASSIC AUTOCLAVE" - denotes Sterilizer Type
"SINGLE " OR "MULTI" " PROGRAM" shows no. of programs etc
"SOFTWARE ISSUE ?????? EG;- NSW418P

TIME and DATE of the on-board clock are shown.

Please keep a note of these displays ; You may be asked to quote these to assist the Astell service dept. if requesting service attention .

A unique SERIAL NUMBER is provided which will enable identification of your machine for service and maintenance purposes. This is marked on the *ELECTRICAL RATING PLATE* at the rear of the case

DOCUMENT ISSUES AND DETAILS

Date & MR no	Issue Details	Edition & filename	Details of changes and revisions inc. software issues and manuals
160605	01	A	NEW ISSUE
270407	03	b	Minor text corrections

ABOUT THIS MANUAL

This instruction manual is intended for use by OPERATORS , SUPERVISORS, and STERILIZING ENGINEERS [or their equivalents]. The person who is to be in overall charge of the Sterilizer should familiarise him/herself with the complete system *including* instructions in the other Astell Stericlave Manuals.

It is possible to use the machine in a "Basic" manner leaving out the more complicated operating options.

OPERATOR

The Operator is able to Select the program, Start the Program, Open and Close the Sterilizer door or cover , and load the Sterilizer.

SUPERVISOR

The Supervisor has authority to enter Programs, turn on and off options, set the optional clock , etc. These facilities are only accessible by use of the KEY button on the front panel]

Program settings (sometimes called “Profiles”) can only be entered by the Supervisor.

ENGINEER

The Engineer may set up the configuration of the Sterilizer , select some of the more complicated operating options, carry out certain tests upon the system, and Calibrate the sensors. Access to the Engineering level is through the Supervisor level, by use of a PIN Number “password” or alternatively by setting a small Internal "Programming Switch " which is inside the control pod.

TRAINING

INCORRECTLY USED STERILIZERS MAY PRESENT A HAZARD

For correct use of this Sterilizer it is recommended that Operators, Supervisors, and Engineers are made fully familiar with these instructions, the other manuals provided with the Sterilizer system, and the functions and operation and Safety Aspects of this machine .

In less formal establishments, the SUPERVISOR may be an OPERATOR who has adequate authority and ability to set up the sterilizing process.

The ENGINEER will normally need to have been trained in a relevant discipline , possibly as a Sterilizing Engineer , be conversant with Micro-Electronic system handling procedures, and be suitably qualified to carry out the adjustments and changes that may be required.

ASTELL recommend that the ENGINEERING level is not accessed by anyone who does not have an understanding of the control system instrumentation used in this Sterilizer. The manufacturers reserve the right to restrict warranty provisions if any part of the Sterilizer is modified , removed, or adjusted without express instruction by the manufacturer , or in variance with the instructions in this manual .

EC DIRECTIVES

Your attention is drawn to the EC Low Voltage Directive and the E.M.C. directive which affect modifications and repairs to this equipment. Only parts supplied by the manufacturer as spares or accessories will ensure compliance with the directives.

Single Program and Multi-Program Controllers

This manual covers the Single Program controller . It also covers the 10 Program controllers .

The two controller types share most operating features and operations. The Membrane Keyboards and the method of entering programs are the same and the Displayed messages are appropriate to the control system type.

SINGLE-PROGRAM CONTROLLER

This has only one program and the Membrane Keyboard is arranged to permit Quick Access to the parameters to allow them to be easily changed between cycles. The single program is identical to Program 4 of the Multi-program controller and has identical capabilities, with the exception that the programmer can only be set up to one set of parameter values at a time.

All aspects of these instructions apply unless indicated otherwise. Please disregard any instructions labelled ;-“For 4-or-Multi-programModels ”.

Because there is only one program the “Program Title” feature is not available.

Program Values may be entered by the “Quick-Entry” method or via the Key-Access Supervisor Level exactly as for the Multi-program system.

It is possible to disable the “Quick-Entry” method & to make Program Parameter Entry only available via the Supervisor Key .

To do so enable the **Selector - lock** by setting PROG-SELECT LOCK to ON in the User Configuration level.

OPERATOR CONTROLS & SYSTEM TECHNICAL DETAILS

OPERATOR CONTROLS

DISPLAY LCD
16 Character x 4 - line LCD TEXT DISPLAY

MEMBRANE KEYBOARD

[START] KEY Starts Process
[DOOR] or **[Open]** KEY Open Chamber door
[STOP] KEY Stops Process (with "Key ")
[▲] KEY Increases value (when setting variables)
[▼] KEY Decreases value (when setting variables)
[ENTER] KEY Enters chosen value
"**KEY**" gives access to secured SUPERVISOR and ENGINEERING levels -Also used for stopping program cycles..
Paper Feed KEY Feeds paper (on certain optional printers;- not case mounted or external printers)
"**Clock**" KEY Selects Clock & Date-Setting mode

POWER ISOLATOR SWITCH
Turns on AC Mains Power to the system
This is a Rotary Switch at the front.
Marked [0/1] . The "1" position is "ON".

COOL LOCK THERMOSTAT
This is sited behind the cabinet. .
Senses chamber temp. to restrict opening with hot fluids.See "interlocks" below

OVERTEMPERATURE 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 CUTOUT. (optional)
fixed- not user adjustable
This is sited inside the cabinet & cuts out the control system in the event of excessive temperature rise (eg>150C). It is only resettable by manual operation.

MEMBRANE KEY DELAY

To avoid problems caused by accidental key pressing, several of the keys have a DELAY built-in. If pressing the key does not have the immediate desired effect , maintain pressing for up to 2 seconds. When the key operation produces a BEEP noise, then the keypress has been detected and it is not necessary to keep pressing.

INSTRUMENTATION

CHAMBER Temperature Readout
(Accuracy better than +/- 1.0 Deg C)

LOAD SENSED Temperature Readout
Shown when load sensed timing is selected) (Accuracy better than +/- 1.0 Deg C)

PRESSURE Readout
(if fitted) With automatic Zero
(Accuracy Better than+/- 0.05 Bar)

PRESSURE Gauge Dial Bourdon pressure gauge at front of machine. (Accuracy Better than+/- 5%)

DISPLAY CHECK FUNCTION
Tests Temp and pressure instruments
In READY state - with door shut-
Press the [STOP] key – this will momentarily display current temperature, pressure, etc.

SAFETY INTERLOCKS

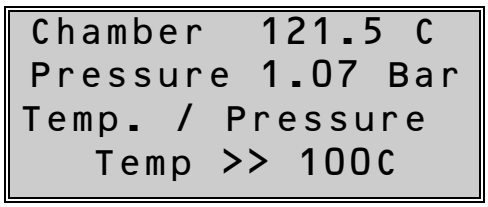
PRESSURE INTERLOCK

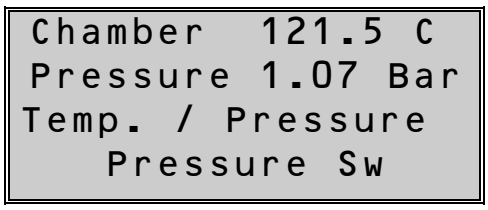
Preset to <+0.15 Bar this is an electrical interlock operated by a precision pressure switch preventing the electrical release of the Closure lock if the chamber is pressurised.

OVERPRESSURE CUTOUT
This is preset to 3.00 Bar. If this operating pressure is exceeded , indicating instrument or safety valve problems, then the heating is shut down, a warning shown and a fault condition generated.
Note that Inspection of the Fault report will show pressure >300= 3.00 bar

TEMPERATURE INTERLOCKS

STARTING- INTERLOCK .
Prevents starting a cycle with a dangerously hot or pressurised chamber.





"Pressure S**w**" = there is pressure in the chamber.
Temp>>100C means the temperature in the chamber is too high.

COOLING LOCKS
There are two Cooling Locks to prevent the Sterilizer 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 FLUIDS and DESTRUCT programs .

PRESET Cooling Lock This is a 0-100 Deg C. thermostat, with Knob, Dial and Scale .
Temperature sensor is mounted clamped to the outside of the chamber. It indicates an ***approximation*** to the load temperature.

PROGRAMMABLE Cooling Lock
This is an electronic system set to a suitable temperature entered within the "Program Profile" . It measures and reacts to the temperature of the Inside of the chamber in the same way as the normal temperature display.
If "LOAD SENSED TIMING" option is fitted this system senses the Load Temperature of the Load Sensing Probe, in place of chamber temperature.

WARNING- THE COOLING LOCKS CAN PRESENT A HAZARD IF INCORRECTLY SET.
They should be adjusted by the supervisor, or a person trained in Sterilizer use & the setting of safe sterilizer cycles.

PRESET COOLING LOCK THERMOSTAT This is a thermostat with Dial & scale calibrated in Deg. ,0-100C, behind the cabinet side cover panel or at the rear.

It measures temperature of the Chamber outer Wall, providing sufficient thermal mass for a reasonable match between the Load Temperature and the Cooling Lock Sensed temperature , although the temperatures will not be quite the same, due to differing thermal inertia.

Normally the Chamber wall & Cooling Lock sensor will cool down faster than the load.

PROGRAMMABLE 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 the Program Profile which is compared with the Chamber Internal Temperature Sensor (the same temperature as appears on the Temperature display). When the CHAMBER temperature is above this "PROGRAMMABLE" cool-lock temperature the lock is active (engaged) and Completion is inhibited preventing the door from unlocking..

The Chamber-Sensor detects the temperature within the steam space & it will normally Cool faster than the Load &/or the chamber Wall.

Load Sensed Cooling Lock
(if LOAD SENSED COOLING OPTION is fitted & 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 "PROGRAMMABLE" 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- LOCK ACTION

The temperature of ACTUAL LOAD and CHAMBER WALL must BOTH be below the two separately-set cool-lock temperatures to allow the cycle to complete.

OVERTEMPERATURE THERMOSTAT

(All electrically heated models)

The Overtemperature Cutout uses an overtemperature thermostat thermally linked to the Chamber and shuts down the control system power in the event of overtemperature operation, which limits heater temperature rise if the system should fail.

When triggered, Power is cut off to the control system .

The power will be restored only when the temperature falls, and the controller will behave as if the power had just been turned on.

OVERPRESSURE CUTOUT (option)

The OverPressure Cutout is Precision Pressure Switch which is sited inside the machine, and is preset to below the safety valve setting It is designed to prevent the chamber exceeding the rated pressure.

The power will be restored only when the temperature falls, and the controller will behave as if the power had just been turned on.

OVERTEMPERATURE CUTOUT Manual reset with alarm (option)

The Overtemperature Cutout **Manual reset with alarm** is Precision temperature Switch which is sited inside the machine, and is preset to below the safe operating temperature for the boiler design it is fitted with an audible alarm.

It is designed to prevent the chamber exceeding the rated temperature.

An overtemperature thermostat is thermally linked to the Chamber and shuts down the control system power in the event of overtemperature operation, which limits heater temperature rise if the system should fail.

The power will be restored only when the temperature falls, and the controller will behave as if the power had just been turned on.

Warning
Overpressure + Overtemperature cutouts

The Manufacturers of this Sterilizer accept no responsibility for damage to the load which may result in this Sterilizer in the event of a overheating/overpressure fault occurring for any reason.

CLOSURE SYSTEM INTERLOCKS.

The cover is prevented from being opened by a solenoid locking bolt pin. This Locking Bolt pin engagement and Cover Position are sensed by high-reliability Micro-switches. The system cannot be started unless the closure is fully secured and locked.

On TOPLOAD models

The Closure interlock system senses the up/down positions of the door and the position of 2 of the sliding bolts that hold the cover shut. The system also senses precisely the engaged position of the solenoid locking pin that prevents the handle being moved.

On FRONTLOAD models

The Closure interlock system senses the position of the door to detec an Open-closed state and and two microswitches precisely measure the engaged position of the solenoid locking pin that both detect the presence of the locking block, and prevents the handle being moved.

The Cover can not be opened if :-

A Chamber Temperature is above Programmed & Preset Cooling Lock setting

B Pressure is above approx. 1.5 p.s.i. /0.2 Bar.(all Programs)

(The Programmable Cooling Lock Temperature is set within each program. But the PRESET 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 30 seconds after pressing the 'OPEN' button before the bolt pin retracts during which the VENT VALVE is open to atmosphere.

The Cover can only be opened by pressing the 'OPEN' button and waiting for the bolt to unlock.

The OPEN button will NOT open the Cover if inhibited by the Cooling Locks or the pressure interlock .

The system will only start and run cycles if the Cover is fully CLOSED & LOCKED.

It is not possible to pressurize the chamber with the Cover Unlocked.

HEATING SYSTEM

On Direct Heated ,models Steam is generated from water held in the base of the chamber .

WATER LEVEL CUTOUT

The Electric Heating system uses an electrical immersion heater and a water level Conductivity sensors acts at "Filling" level . Water is supplied from an internal tank and automatic Water Filling is provided as a function of the cycle.

A second water level Conductivity sensor detects LOW WATER state in the chamber.

AIRPURGEING SYSTEM

Note; "Airpurgeing" 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. This may also be called **"FREESTEAMING"** .The Program Profile control provides an adjustable period of 'AIRPURGE' 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 close to boiling point. This can be adjusted to allow for altitude effects. (see calibration section)

STERILIZE TEMPERATURE CONTROL SYSTEM :

The Chamber Temperature Is measured by a PT100 precision sensor. This is compared with the Sterilize Temperature - the "SETPOINT" stored in the Program Profile, and the controller acts to keep the chamber at or about that temperature by switching the heat source. Control of temperature does not rely on steam pressure.

The actual temperature that the control system tries to attain for will be varied automatically at different parts of the cycle . This does not require user attention during the cycle .

STERILIZE TIMING SYSTEMS :

a] 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.

Heating Failure "DROPBACK :" protection resets the Sterilizing timer should a fault cause the temperature to drop below the Sterilizing setting during the Sterilizing period. When the temperature rises again the timing restarts. The standard dropback level is 2 C below set temperature but may be adjusted.

b] Load Sensed Timing System;-
(Optional Extra)

LOAD SENSED TIMING is selectable (on or off) within the Program. A "threshold" is set automatically within each Program at *2 degrees C below the sterilizing temperature set in that Program*. This threshold is compared with the Temperature measured by the LOAD SENSING PROBE (the flexible wandering probe placed by the user within the load or load simulator).
During the part of the cycle "HEAT-TO STERILIZE" , the load heats-up slower than the chamber. The Chamber reaches set temperature first, and is maintained there by the controller.

When the rising temperature in the load catches up with the threshold (eg the Sterilizing Temp), this is sensed and the Sterilizing Timer System starts , the Display changing to show "STERILIZING" with the normal time count-up on the display.

c] Load Sensed Timing combined with PROFILED OVERSHOOT
(may be set in configuration if Load Sensed Timing option fitted)

This system gives PROFILED OVERSHOOT. This system is Active if Load Sensing has been selected for a particular program.-AND it has also be set ON in Configuration.

Explanation Of Profiled Overshoot
Alternative systems of Load Sensed Timing are compromised by the fact that due to calibration and performance tolerances and offsets, the temperature threshold which starts the cycle timing cannot be closer to the chamber setpoint set for the process than approx. 2.0 C for reliable operation.

The "PROFILED OVERSHOOT" avoids this by dynamically changing the setpoint temperature automatically in a series of profiled stages to match the temperature of the load heating up. This achieves a threshold temperature exactly the same as the Sterilizing temperature and a further function compensates for the small temperature offset between load and chamber during Sterilizing experienced in normal use. This system is integral with and dependent upon the use of the Load Sensing system.

The LOAD SENSING PROBE detects the temperature within the LOAD (If correctly positioned) and ensures that the load experiences the set conditions for the set time, without any need for compromises or extended times to allow the load to "catch-up".

The LOAD SENSED TIMING option also automatically implements LOAD SENSED COOLING LOCK for that program.

IT IS MOST IMPORTANT THAT IF LOAD SENSING IS SELECTED IN THE PROGRAM, THE LOAD SENSING PROBE IS ALWAYS PLACED IN THE LOAD OR CORRECT STERILIZING WILL NOT TAKE PLACE!

COOLING

Cooling action operates whenever appropriate in the program and only for program types that do not permit DRYING, eg Fluids cycles At the end of Sterilize for Liquid /Fluid programs , initially convection ambient cooling cools the chamber to a preset pressure threshold. When this temperature is reached the water is discharged 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 preset to just above 100C, which may be adjusted.

HOLDWARM

Some models are designed to operate with HOLDWARM. This will normally have been built-in at time of order in the form of increased water reserve levels.

This should not be confused with a MEDIA MELTING or WARMING PROGRAM.

These models normally have an increased water level reserve. The HOLDWARM system can be turned on in configuration mode, BUT if turned on on a machine which is not provided with a increased water reserve, then the holdwarm time may be limited to 1-2 hours or less.

The **Holdwarm** system is designed to allow sterilization 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. On a suitable model, The media will be kept warm for up to 8 Hrs

The Autoclave may be set to operate overnight with a Media Load, in the knowledge that it will contain a useable load when opened in the morning. It is much better though to use **the DELAYED START** system to reduce media deterioration.

The Holdwarm temperature is automatically set to 25C below the Programmable Cooling-lock temperature as set in the program. Holdwarm (if configured to be available) may be selected on or off within the program profile.

Holdwarm appears as a stage between ASSISTED COOLING and COMPLETE

When the Completion Conditions are met as described elsewhere in this manual the system then changes to Holdwarm stage,

During Holdwarm the display shows;-

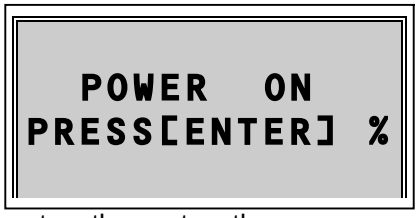
POWER ON , STARTING UP,, AND OPENING THE DOOR

POWER-ON

When power is applied the system goes through a START-UP PROCEDURE which displays the system settings. Then it shows .

Press **[ENTER]** key to reset the system.

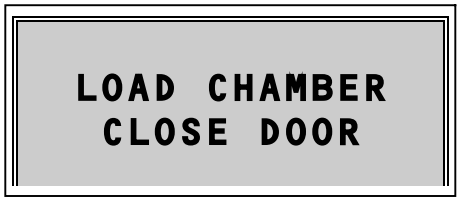
If the message is " WAIT…" or " KEYFAULT" there is a stuck key on the keyboard – consult service dept.



The system then enters the **OPERATOR MODE** giving access to the following ; -

[OPEN] Open the chamber closure door

[START] Start the selected Program



❶❷❸❹ Quick-Select one of the 1st 4 Programs

[Enter] **Select a program (1-10)**

[▼] or [▲] Adjust settings

"KEY" **access to SUPERVISOR levels**

Selects Clock setting

SETTING CLOCK

Press “CLOCK” key

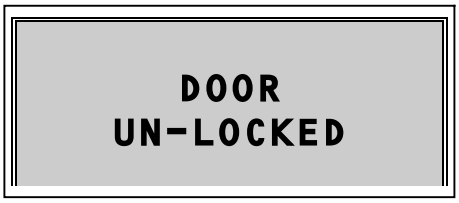
Clock Setting uses **[▼] [▲]or [ENTER]** keys to adjust the Hrs, Mins, Day ,Month & Year. At the moment when the ‘Enter’ key is pressed after the Minutes. entry, seconds are reset to zero.

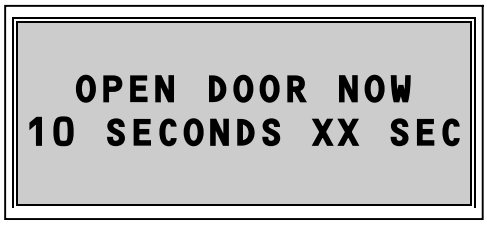
OPENING THE CLOSURE (DOOR)

The door can only be opened when it is safe to do so. There is a 30 second safety delay between pressing the "OPEN" Key and the bolt release which allows the door to be opened.

Press the "OPEN" Key; the display will show

the “xx SECONDS” will count to 30, when the LOCKING BOLT withdraws for 10 Seconds





DURING THE 10 SECONDS
ROTATE the DOOR HANDLE
The sounder may beep.
The “xx SECONDS” will count up .

ROTATE THE HANDLE
SWING OPEN THE COVER/DOOR.

If the door is not opened within the 10 Seconds the bolt re-engages and the **[OPEN]** Key must be pressed again .

Note;-
Never 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.

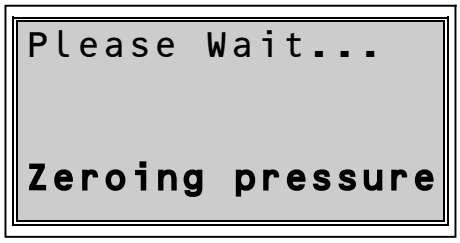
HANDLE LOCKED WITH DOOR OPEN

If the handle is rotated to the “LOCKED” position with the door open then the lock will engage so the door cannot be closed until the locked handle has been released.

Press [OPEN]
The bolt will retract for some seconds. Return the handle to the unlocked position.

DOOR OPEN , AUTOZERO PRESSURE

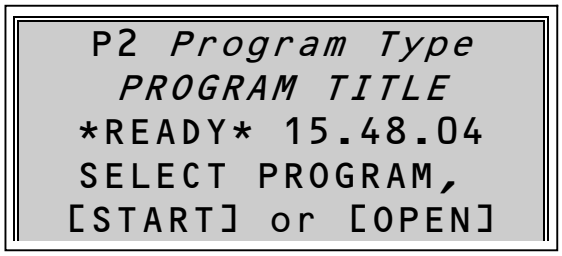
When the door is open the system periodically re-sets the Zero-Point on the Pressure - Measurement System. This message will show briefly. It does not affect the normal operation of the machine.



SELECTING A PROGRAM

The system must be in the "READY" display mode with the Cover closed & locked

The system will show a “READY SCREEN” similar to this;-
(The bottom line has a message scrolled across the display☺



1st line= Program Type eg “Liquidload A”

2nd line= Program Title
(as entered by user or installer)

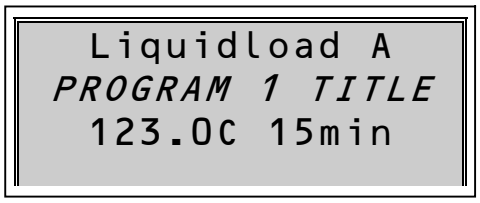
3rd line= **READY** stage name & Time

4th line= Scrolling message of what to do next “Select Program, [Start] or [Open]”

Method 1
Quick-Select one of programs 1,2,3 or 4

PRESS KEY,❶❷❸ or ❹..... etc

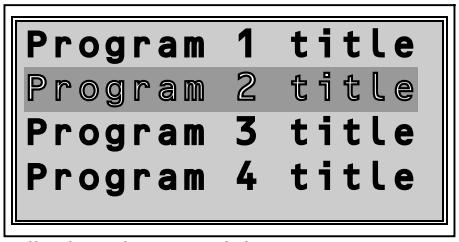
The Display will change to show the Parameters and BASIC Settings for the selected program.
(note titles, temperatures and times may vary from the examples shown here)



METHOD 2

To select ANY one of the 10 Programs

Press the **[ENTER]** button



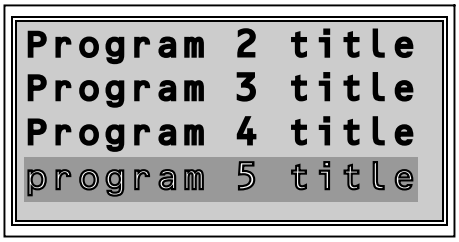
The display shows 4of the 10 program TITLES

The examples given ;- eg “ Program 1 Title” etc are those preset in the factory but will normally represent a title understood by the user,

eg “ Media B 1L flasks” would be a typical title.
(These should have been chosen and entered by the user or commissioning engineer)

One line will flash to indicate the chosen program. (here shown in white)

Press the Up or Down buttons and the flashing line moves up or down the screen to select the different programs.

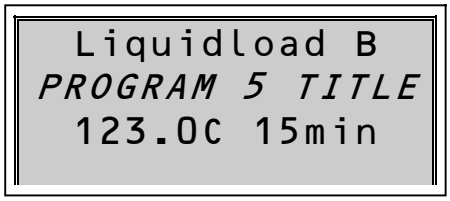


When the line hits the bottom the numbers move up to make room , and similarly at the top.

All 10 programs can be selected

When the required program is flashing press the [ENTER] button to select it.

The Display will change to show the Parameters and BASIC Settings for the selected program.
(note titles, temperatures and times may vary from the examples shown here)



Example Program Types
Classic model

Waste Destruct…135.0 C 30 Min…….

Liquid load A …123.0 C 15 Min…….

Liquid load B …123.0 C 15 Min…….

Glassware …123.0 C 15 Min…….

Waste Destruct …135.0 C 15 Min……

Media Warming …135.0 C 15 Min……

☞When using the [▼] , [▲] or [Enter] routines to change values or settings

Holding the [🔑] key Pressed whist simultaneously pressing the [▼] or [▲] button

will alter the value on the display in 20's instead of single digits. This makes large changes quicker and easier .

STARTING A CYCLE

The Chamber Closure Door /Cover must be closed and locked

Note
If your machine does not have Automatic Water Fill option you must fill the chamber manually- please refer to the operating instruction manual for details.
Until this point the chamber will display the message

" PLEASE FILL"

Select the chosen Program Cycle,

PRESS the **"START"** Key.

IF DELAYED START is NOT selected *in config. the Cycle Starts immediately*

IF DELAYED START IS SELECTED *in configuration then you are asked to enter the start delay in HOURS Then press ENTER*
(see later for details)

If a Printer is fitted then the Printout Heading and cycle description will be printed.

The Cycle will start.

The controller will perform the program profile automatically without any need for operator attention until completion.

Note
Automatic Water Fill option

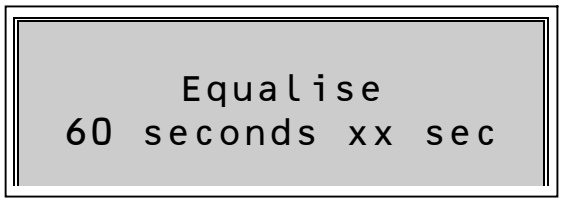
If your machine has this option, at Start. it will go to the

"CHARGING WITH WATER" stage .

Water will be pumped into the chamber base until it reaches the upper Running-Level probe , at which point the cycle will go to "**HEAT TO STEAM"**
stage and proceed normally as described.

COMPLETION OF CYCLE

Immediately before the COMPLETE stage is the EQUALISE STAGE
Here the chamber is given a chance to equalise temperature and pressure with the outside world.



After the 60 seconds counts, the system goes to COMPLETE STAGE

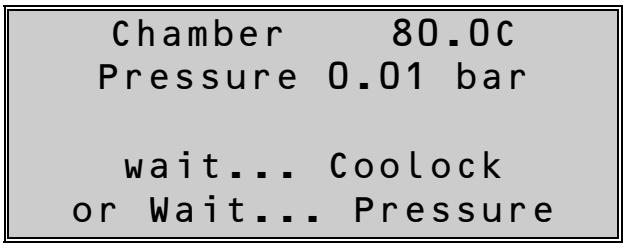
The "Complete" stage occurs when following conditions are met ;-For ALL Programs

1 Pressure in the chamber is less than about 0.15 bar

2 Temperature of the CHAMBER is below the Programmed Cool lock Temp. or; **If Load Sensed Timing is fitted**;- The Load temperature is below the Programmed Cooling Lock Temp.

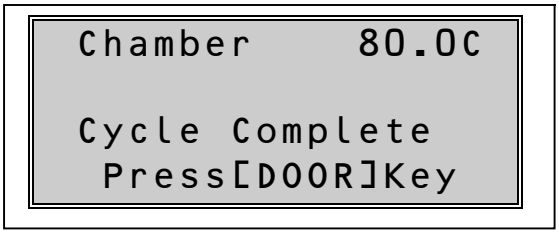
3 Temperature of the COOL LOCK Thermostat sensor on the chamber wall is below the set cool lock temperature .

Until the stage is reached the following screens show what is delaying completion of the cycle. ;



"Coolock" is the Cooling Lock Thermostat and "Pressure" denotes the Pressure switch. These will not normally show and you may need to consult your supplier for advice.

When COMPLETE STAGE is reached



There is a repeated warning “Bip” from the sounder

Press the Open Key , the Door Unlock proceeds as previously described.

after 30 seconds, Unlock and Open closure.

To Stop Holdwarm

Press **[DOOR] key ie [open] key**

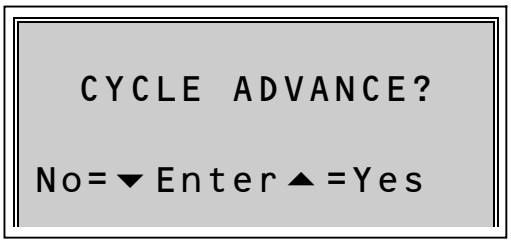
This will terminate **HOLDWARM** stage and the **COMPLETE** display will appear.

Open the chamber by pressing [OPEN] in the normal manner.

STOPPING A CYCLE and Cycle Advance

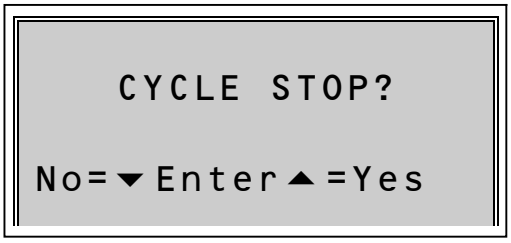
Press **[🔑]** and **[STOP]** together.

There is a choice of a MANUAL ADVANCE **to the next stage or a** CYCLE STOP



Press either [▼] or [▲] keys

Not all stages may be advanced. The cycle Stage will move on if this is possible & available.



Press either [▼] or [▲] keys

Choosing **STOP** will cause the **CYCLE** to abort but the sterilizer will continue to operate until the chamber and load have been made safe. This requires that the cycle end /cooling stages are completed.

Choose No = ▼ to go back to normal running operation.

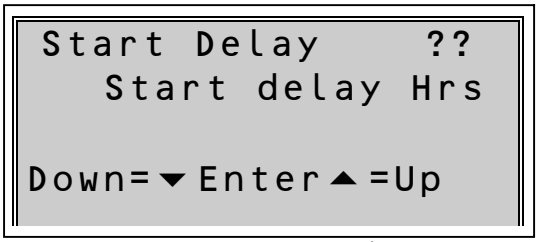
NOTE;-
If left in this state without any actual entry, after a period of time the system will automatically go back to running.

START DELAY

DELAYED START- If selected in Configuration this allows a delayed start of the selected program to permit it to automatically start-up after a set time , for example This allows a cycle to automatically start itself and complete in time for the Laboratory to open in the morning.

The actual Cycle-Start Time may be delayed by a selectable time up to 18 hours after the Start Button is pressed.

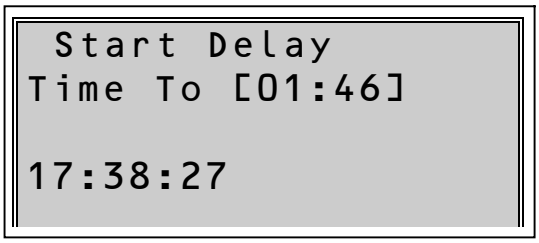
Press **START** Key



Press Up/Down to set Start Delay in Hours
Press ENTER to Initiate cycle/Start

There is a 10 second period for you to begin setting a delay time.
I**f no time is set the cycle will start immediately**

DURING DELAYED START COUNTDOWN



2nd line shows time to go
Cycle will start in 1 hr 46 minutes

4th line shows current time

TO ABORT A DELAYED START

Press **STOP** button

Delayed start countdown will stop and system goes to Ready.

PROGRAM CYCLES - DETAILS & DISPLAYS

The CLASSIC models covered by this manual are programmable and the details of the cycles can be changed , the program profiles are set from the SUPERVISOR LEVEL and not accessible for change by the user .

For Each Cycle-

The Sterilize Time,/Temperature, Airpurge Time , Sterilize period, & other variables are set to provide the desired Cycle Profile.

Please note that correct Sterilization is dependent upon the program PROFILE being suitable for the load and processing required.

DETAILS OF CYCLES

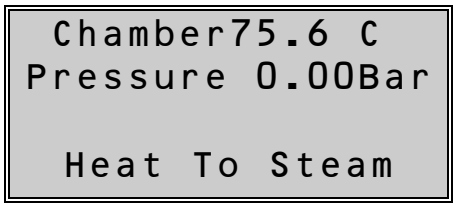
Throughout each cycle the LCD display shows Temperatures, Times, and other cycle stage information.

These particular cycles have a slow pressure release and NO drying facilities.

When the cycle has been started the heating begins. A cycle cannot be started with insufficient water.

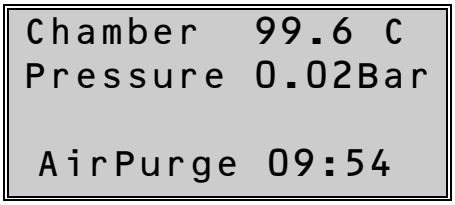
Please see AUTOFILL section if your machine has Autofill option installed

HEATING TO STEAM



When approx. 95-99 C is attained the Airpurge Period begins....(this temp is adjustable)

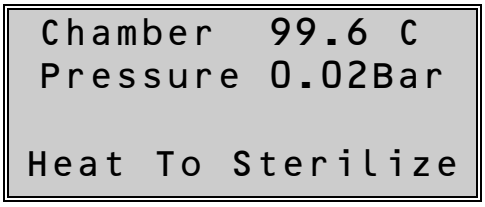
AIRPURGE



The Time counts down in Min & Secs to show Airpurge Time Remaining.
(See PULSAR Pulse Freesteam section)
(An Airpurge time of 7 minute is the minimum advised for solid loads such as empty glassware but longer Airpurge times are usually requred.).

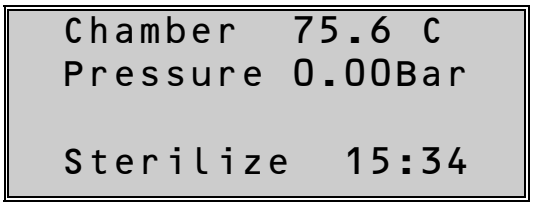
HEAT TO STERILIZE

When Sterilizing Conditions are reached , ie steam saturation in the load , defined by the elapsed Air Purge Time, the Sterilize Period begins .



STERILIZE PERIOD

LOAD HEATING TO TEMPERATURE and OVERSHOOT BOOST options/settings
See LOAD SENSED TIMING & OVERSHOOT BOOST



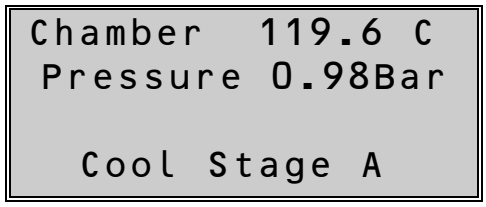
The temperature and pressure will fluctuate within +/-1 Deg C as the system controls at the set temperature. The time counts down in Min & Secs showing the Sterilize time remaining.

AT THE END OF THE STERILIZE PERIOD THE COOLING STAGES START

.

COOLING stage A

At the end of Sterilize period COOLING stage A begins.



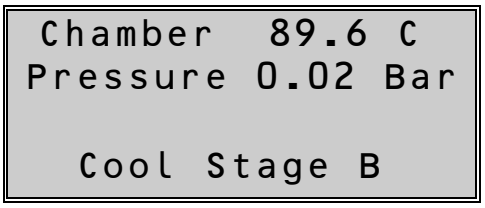
If ASSISTED FAN-COOLING is fitted , the cooling fans will start at a temperature of typically 100-105C . This level is preset in the CALIBRATION of the machine & may be adjusted

The chamber and load cool until the pressure has fallen to a threshold level of typically 70 mBar **above ambient.**

The cooling then moves on to stage B

COOLING Stage B

The chamber and load cool until the complete conditions are met.



The 2 COOLING LOCKS prevent opening until the load has cooled to a safe handling temperature.

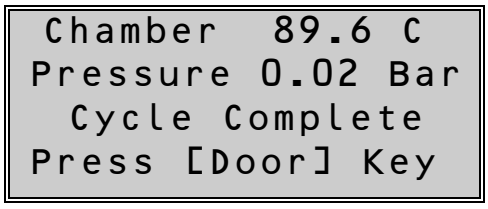
PRESET Cooling Lock This is the 0-100 Deg C. thermostat, at the back of the case. It measures temperature of the outside of the chamber indicating an approximation to the load temperature.

PROGRAMMABLE Cooling Lock
This is an electronic system set to a suitable temperature entered by the Supervisor within the "Program Profile" . It measures and reacts to the temperature of the **Inside** of the chamber.

If "**LOAD SENSED TIMING**" option is fitted this senses the **Load Temperature** instead of chamber temperature.

COMPLETE Stage

If HOLDWARM is not selected ;
(see HOLDWARM, next item)
When the "Complete" conditions are met display shows ...



You may now Open closure as normally

Press the [Open] Key , after 30 second. delay, Unlock and Open closure.

Note

To silence BIP noise warning without opening door press OPEN button but do not open door and after that BIP noise is muted

HOLDWARM

The Holdwarm system is designed to allow sterilization 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.

Holdwarm appears as a stage between ASSISTED COOLING and COMPLETE

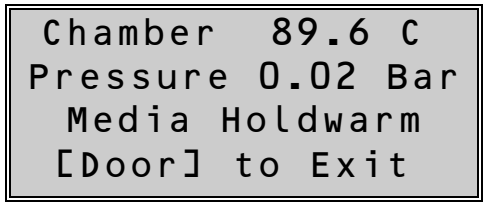
The media will be kept warm for up to 48 Hrs .

The Autoclave may be set to operate overnight with a Media Load, in the knowledge that it will contain a useable load when opened in the morning…. or later in the day.

The Holdwarm temperature is fixed to 25C below the Programmable Cooling-lock temperature set in the program.

Holdwarm may be set on or off within the program profile.

When the Completion Conditions are met as described above, if selected, the system goes instead to the HOLDWARM stage



TO STOP HOLDWARM
Press **[DOOR] key**

This will terminate HOLDWARM and move to the **COMPLETE** Stage
(see previuous item)

Then Open the chamber in the normal manner.

AUTOFILL OPTION

The Autofill option comprises a water tank and c float switch controlled inlet valve. It also has a low water float switch to detect water level supply problems.

If fitted and configured ON the system operates as described but when the cycle starts it fills with water supplied from the tank a pump up to the "RUNNING LEVEL" set by the upper conductivity probe in the chamber.

During this period the system displays ;-

```
Charging With
Water
```

If this goes on for too long there may be a problem with water level detection, water quality, or thepump and valvework. Please consult your service agent.

At the end of this it goes to the stage "HEAT TO STEAM "

If the water supply is affected and the tank level falls the system will detct this and indicate;-

```
Autofill tank
Level low
```

Seek the source of the problem before calling for service as the usuakl cause is that someone has turned off the water!!

PULSED FREESTEAMING Option

The PULSAR (pat) system is a Astell patented system for improving steam penetration into difficult loads without requiring the complication of vacuum pumping systems.

When this option is fitted and selected within a program , the behaviour in the AIRPURGE stage is different

```
Chamber  99.6 C
Pressure 0.02Bar

PulseFS * 09:54
```

The * shown here is replaced by a symbol denoting state of the exhaust valve.

This is either "□" BOX symbol
- This means the Valve is closed
or
"Three short lines" symbol " ≅"
This means the valve is open.

The valve cycles on and off throughout the Airpurge period to achieve the PULSED FREESTEAM operation.

Explanation Of Pulsed Freesteam.

PULSAR FREESTEAMING is the Astell name for this patented system.

With this arrangement the controller turns the VENT STEAM EXHAUST VALVE on and off in a programmed manner, to permit steam to escape in bursts, building up pressure slowly during the "closed" period and releasing this to atmosphere during the "open" period. This causes the Boundary layer to move up and down within the container, and the pressure reduction during the "open" period is fast enough to cause great turbulence within the chamber, breaking up the boundary layer, and drastically increasing the rate of diffusion of steam into the container and load.

The Open-Closed Cycle is factory-set to Typically 1 min open, 1 min closed .

Steam Output Quench-Cooling

This is an optional extra

This system requires a supply of Cold mains water (see installation manual for requirements which are the same as for AutoFill)

The Cold water is injected into the output exhaust pipe during the Steaming stages.

The water flow cools the steam and ensures that the output is compatible with plastic drainage.

If the water flow is too low or the supply is cut off the system detects the temperature rise in the pipe and shuts the steam exhaust valve, - this will result is a failed cycle but will prevent the consequent damage to the building drainage pipes.

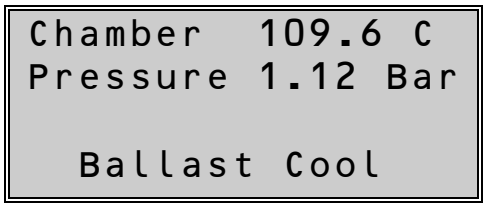
Air Ballast COOLING

This is an optional extra

This system uses either an additional air compressor or a building supply of comprtessed air,. A regulator and filter supply the aair to a solaenoid valve which introduces it to the chamber during cooling.

The Compressed air is metered into the chamber and the pressure controlled by themicroprocessor to establish a pressure which is higer than the pressure within Sealed Fluid Bottles during the cooling phase to allow sealed containers to be used and reduce boilover.

A typical display would be as below



At the end of Ballast cooling there is a EQUALIZE period of 90 seconds then the system goes to COMPLETE stage as before.

NOTES AND SUGGESTIONS On Programming

LIQUID CYCLE
This is suitable for processing Media or other fluids etc in UNSEALED containers.

WASTE DESTRUCT CYCLE
This is suitable for processing laboratory waste;- petri dishes, tubes, jars, bottles etc. These must be in a shallow open container and not sealed in a plastic bag.

GLASSWARE CYCLE
Suitable for sterilizing Empty Unsealed Glass containers, animal cages, metal or plastic containers, etc.

MEDIA WARMING CYCLE allows the heating ./ melting of media without full sterilization

SEE NOTE LATER IN THIS SECTION

LOAD SENSED TIMING
Option- see Load Sensed Timing

STERILIZE TIME ;
Set the Sterilize time to the desired exposure time.

Allowance For Extra Time For Load To Reach Sterilize Temp
These 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 Sterilize time to compensate. Please see SETTING UP AND COMMISSIONING SECTION

STERILIZE TEMPERATURE;
Set to the desired sterilize temperature .

COOLING
Cooling mode is automatic- chamber cools naturally to threshold then vents water and continues cooling to cool lock temperature.

COOLING LOCK(S)
Set to 80C for safety.-
Please see SETTING UP AND COMMISSIONING SECTION

MEDIA MELT/ WARMING CYCLE

This system allows media MELTING / WARMING cycles below 100C.

If one program has been set as a Media Warming Cycle then with this program, You still need to set the parameters to suit your desired cycle.

The key difference is that this cycle will not heat the load to a “sterilizing” temperature such as 121C but will work with a temperature set below 100C, but suitable to melt the media.

The actual process does involve the chamber reaching 100C for a short period but this is essential to ensure the steam purges the air from the chamber. then the temperature drops to the set process temp . Since the load thermal inertia will cause the load to heat slowly it will not itself reach 100C.

The program sequence is:-
1 start normally,
2 Heat Chamber to approx 95-99C
Stay at that temp for AIRPURGE period as set in program
3 Reduce CHAMBER temp to typ 80-95C,
= MELTING TEMP as set in program
4 control at the Set Temperature for the duration set on the Sterilize Timer .for the program
5 the chamber does not go above 100C which would be a normal sterilize temperature.
6 The program will perform the timed period and enter cooling just as with another program type. there will not be a Chamber Venting (blowout) action since the chamber is not pressurised

7Completion etc are as normal and obey the cooling lock system as before.

STERILIZE SETTING WITH LOADSENSE TIMING OPTION FITTED.

The Load Sensed Timing system detects the Load temperature , and automatically allows for the time-lag caused by the load delay in reaching sterilize temperature.

Set up the system as described above for the system Without Load Sensing, but with the following detail changes ;-

a) Set the STERILIZE TIME to the Actual DESIRED STERILIZE TIME.

-The Chamber Temperature will heat to the Set Sterilizing Temperature, and will display a message "LOAD HEATING TO STERILIZE". The Sterilizing timer is stopped.
When the load reaches Sterilizing Temperature the Sterilizing Timer will START , and the cycle will proceed. (It is not necessary to note down any value or time .)

GENERAL PURPOSE CYCLE

For sterilizing Laboratory Glassware, containers, cages, etc,

These can be sterilized using the same cycle as the DISCARD load described above. AirPurgeing as short as 8 min may be required for simple loads where the steam can penetrate the load easily. Small bottles, tubes, etc may need AirPurgeing up to the maximum allowed time

The Cooling Lock Temperature is of less importance if the load does not contain liquids. The chamber will cool down more quickly than the load, so if the Programmable cooling lock is set to 99C the limiting factor will be the Preset Cooling Lock, This must be left set to suit the worst-case Liquid load if the autoclave is used for liquids.

If not used for liquids at all , Preset Cooling Lock may be set to 99C.

LABORATORY FABRICS, LAB COATS, etc

For best results these items should only be sterilized in a purpose-built Sterilizer with a specific Fabric/Textile cycle such as the ASTELL STERICLAVE range of sterilizers
This Autoclave is not designed to process Fabric Loads, Unless as an occasional or emergency "Make-Safe" function as part of a decontamination process.

Whilst it is possible to process unwrapped simple and light fabric loads, they will come out saturated with water and sterility will be compromised, since there is no Drying function.

Such items must always be loaded loosely and not folded or wrapped to allow easy steam penetration to all sides , but even so sterilization may not be perfect.

Use the same cycle settings as for a Makesafe / Discard load as described above, with maximum AirPurge time.

SETTING UP AND COMMISSIONING

This Machine comes with the programs pre-configured and parameters set to typical program profiles to suit appropriate loads. The Sterilize Temperature and Time are adjustable from the front panel by access to the SUPERVISOR level.

It is not suggested that you use these programs as they are. It will almost certainly be necessary t adjust one or more of the parameters to suit the laboratory preferences and requirements. As a minimum the PROGRAM TITLES should be set up to represent names that can be remembered in the lab.

Typical Factory Settings (as Delivered)

PARAMETER	FLUIDS	GLASSWARE	DESTRUCT
STERILIZE TEMPERATURE	121	121	134
STERILIZE TIME	15	15	30
AIRPURGE TIME	30* *	7	7
COOL LOCK TEMP.	80	99	80
	no	X	no

AIRPURGE - Suggested settings ranges shown below-
Note that the MINIMUM airpurge time is typically 7 minutes and is preset in calibration to ensure adequate performance.

SOLID LOADS/Glassware
Set the Airpurge period to 7 – 10 minutes ..

LIQUIDS ;-
Set the Airpurge period to 7 – 45minutes*** ***

WASTE DESTRUCT ;-
Set the Airpurge period to 7 - 45minutes *** ***

*** * AIRPURGE TIMES**
may be called “”FREESRTEAMING TIME “”
Airpurge times longer than 35 minutes on a **unloaded or lightly loaded chamber** or open load containers which can collect and trap condensate from draining back down to the chamber base- have the potential of boiling dry cause excessive heating in the condensate bottle and potential hazards from steam and condensation. **Please ensure loading matches the selected cycle.**

Also Beware the effects of containers that trap water- see earlier section re “LOADING”

SELECT STERILIZE TEMPERATURE / TIME

The U.K. Medical Research Council recommended the following time/temperature relationships for the achievement of sterilizing conditions:-

Minimum Sterilize Temperature	Maximum Sterilize Temperature	Minimum Sterilize Hold Time
134	**138**	**3 min**
126	**129**	**10 min**
121	**124**	**15 min**
115	**118**	**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 may 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 +/- 0.7C around the set sterilize temperature. Where temperature is specified as “-0 +??” adjust the temperature as shown here.

Specified Settings	Recommended Program Settings
134C -0+4 3 mins	**135C or 136C ;** **3 mins**
126C -0+3 10 mins	**128C** **10 mins**
121C -0+3 15 mins	**123C or 122C** **15 mins**
115C-0+3 30 mins	**116C** **30 mins**

CALIBRATION

This machine has been factory calibrated to NAMAS standards by Astell Scientific. It is often the case that a machine must be calibrated on site to comply with local requirements, and this can be carried out by Astell Engineers. Details of full on-site Calibration techniques are in the Service information provided to agents or in calibration Instructions available to download on request.

Note that calibration requires specialist calibrated reference thermometers and pressure gauges , and an understanding of sterilizer calibration and thermocouples.

Autozero Pressure Calibration

When the door is open the system periodically re-calibrates the "ZERO" setting of the pressure transducer. A brief warning message may appear during this period. It does not affect any other operations and requires no user intervention.

SETTING COOLING LOCKS

The Cooling Locks are present for all cycles including Solid loads and Glassware programs

Warning-
Cooling Lock settings are part of the safety system and are the responsibility of the owner/ user of the machine . they must be set to provide safe conditions for unloading the chamber. Setting is the responsibility of the person with Supervisor access . Do not leave the settings as delivered by the factory. .

To allow for control over cool lock operation the Programmable Cooling Lock temperature can be set to (say) 99C for these loads but the Cooling Lock thermostst will override the settings. A compromise can be reached with the PROGRAMMABLE cool lock stat set to (say) 95C and the PROGRAMMABLE cool lock value set to release at the desired temperature.

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 80C before the load so (unless load sensed timing is fitted + on) the cooling lock setting will need to be BELOW the temperature

It is possible to set-up 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 100C is required.
Load the chamber with the desired load, and make a first approximation of cooling lock temperatures . 80C is suggested for both the Programmable and Preset 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 (80C suggested).
The measured temp. is likely to be higher than the desired temperature. Adjust the Programmable and Preset 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.

SETTING COOLING LOCKS with LOAD SENSED TIMING OPTION

COOLING LOCK TEMPERATURE

With LOAD SENSING SELECTED

The LOAD SENSING option automatically changes the PROGRAMMABLE COOLING LOCK to a mode which detects the Temperature of the Load itself via the LOAD SENSING PROBE , instead of sensing the temperature in the Dummy Load..

Set the **PROGRAMMABLE 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.

Because the cool lock senses the actual load temperature there is no compromise , estimation or guesswork required over the release temperature.

SUPERVISOR LEVEL

PIN NUMBERS - There are two security pin NUMBERS for normal use and a specialist number for exceptional use by a calibrating engineer (in the event of factory recalibration requirement.)

USER ---- ENGINEER --- ADVANCED

The **USER PIN** number is adjustable to user choice. This is done in the USER CONFIGURATION section.

USER PIN
Initial Factory set to **157**

New Setting

You may choose to Record any new setting

The initial PIN NO remains as factory-set unless changed by the operator in Supervisor. Level

The **ENGINEER pin no** is fixed. It is made available to approved/authorised service engineers and agents and to End-Users on request.

ACCESS TO SUPERVISOR LEVEL

The Chamber must be Closed and Locked
This will normally be in "REAFDY" stage

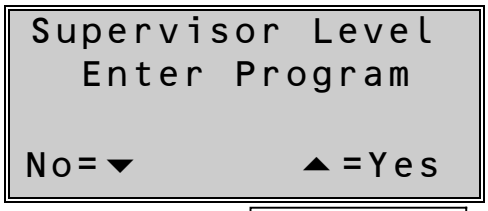
Press the [KEY] button - when prompted , Enter the **USER** PIN number .
The display starts off at 197 , use the keys to change to the User PIN no .

Press "Down" to decrease value,

Press "Up" to increase value,

Press "Enter" to select that value.

This gives access to the Supervisor options;-



"YES" to Enter Programs

"No" to Skip to next section **SUPERVISOR OPTIONS**

ENTRY AND EDITING PROGRAMS
See page xxxx

Fault-Report

Press **No=▼** to move on

Press **▲=Yes** to Print or Show a copy of the report for the last fault that happened . See FAULT REPORT section

WATER QUALITY?

Water conductivity indication.

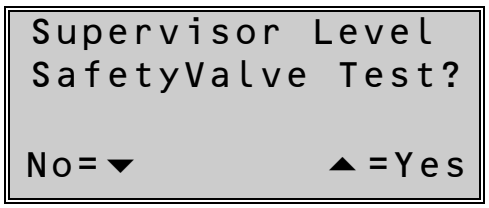
Press **No=▼** to move on

Press **▲=Yes** to show the water quality figures

Water Quality Figures

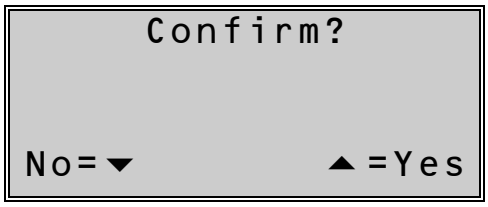
The two figures show the relative water electrical conductivity (in arbitrary units) in a form that Astell can use to advise you over possible water quality problems.

SAFETY VALVE TEST



Press **No=▼** to move on

Press **▲=Yes**
The Next Program Run Will Perform The SafetyValve Test



Press **▲=Yes** to run test

Answering "YES" will force the NEXT program cycle to use a preset set of parameters specifically for testing the safety-valve. This runs at excess temperature and pressure.

Do Not Use except for Safety-valve testing.

You must first have Set up the Sterilizer with no load, and close the cover. THEN Go to Supervisor mode, move through to SAFETY-VALVE TEST? Enter YES ,then YES to the "CONFIRM?" question .

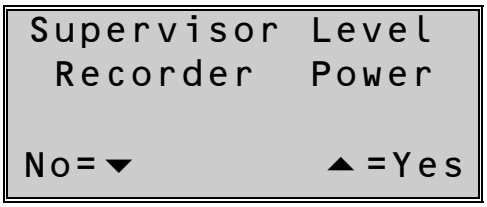
Then step through & quit Supervisor Mode. - The display shows a warning about Safety Valve Testing, and then changes to "READY " mode , with a warning noise. Press the START Key to start the safety-valve test cycle.

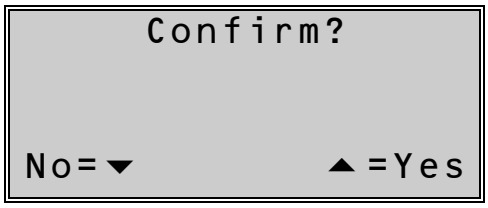
NOTE ;- ESCAPE ROUTINE…If this mode is entered in error Press the OPEN key , and open the chamber. This will reset to the previous settings for the program.
If the cycle is started in error abort the program.

Your attention is drawn to the section on Safety-Valve Testing .

Recorder /LOGGER Manual Power

Only appears if Recorder Power Switching option is incorporated and configured to operate.

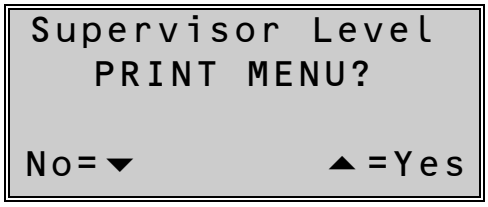




Press **▲=Yes**
to "Toggle" ON or OFF the external recorder power switching incorporated with Astell Recorder Options or the VOLT-FREE contacts used to control ASTELL Datalogger options. permits changing of Charts, testing, etc.

PROGRAM MENU

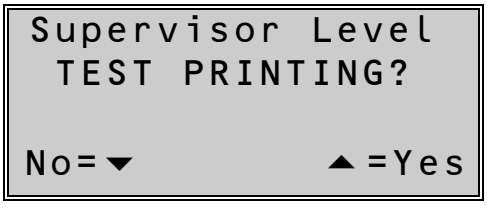
Only appears if Printer Option is fitted



Press **No=▼** to move on

Press **▲=Yes**
Prints a simple Menu of the programs in this machine , as currently set.

TEST PRINTING?



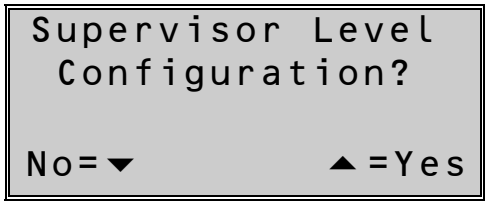
Press **No=▼** to move on

Press **▲=Yes**
to Print a simple printing – quality test on the optional printer (if fitted)

CONFIGURATION

USER CONFIGURATION

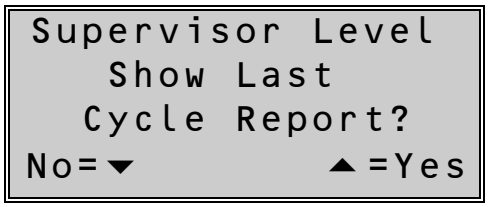
The “User” section of Configuration is accessible to the Supervisor, including changing or setting the USER PIN NO. For details of complete Configuration see later section



Press **No=▼** to move on	Press **▲=Yes** to enter USER CONFIG. Mode See CONFIGURATION section - later on

CYCLE LOG

(not available all versions)



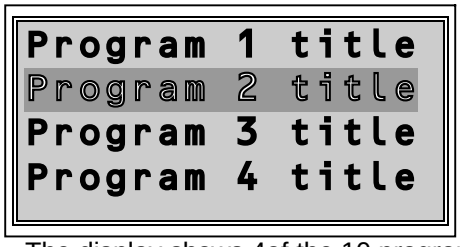
Press ”Yes” to display the log of the last cycle

If the Printer is fitted then the log will be printed. If not it will display on the screen and requires keypresses to step through the report one line at a time so that it may be written down.

The report comprises a list of the cycle details and the times at which the following stages started and ended
Start cycle
Start Airpurge
End Airpurge
Start Sterilize Period
End Sterilize Period
Complete
It also includes faulty cycle indication.

PROGRAM ENTRY

Program Selection;-



The display shows 4of the 10 program TITLES

The examples given ;- eg " Program 1 Title" etc are those preset in the factory but will normally represent a title understood by the user,

eg " Media B 1L flasks" would be a typical title. (These should have been chosen and entered by the user or commissioning engineer)

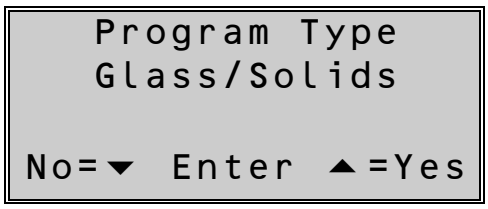
One line will flash to indicate the chosen program. (here shown in white)

Press the Up or Down buttons and the flashing line moves up or down the screen to select the different programs.

When the line hits the bottom the lines move up to make room , and similarly at the top the lines move down

Press [ENTER] to Select the PROGRAM which you wish to change or display the set cycle parameters

Choose Program Type
Press the desired Program Select Button



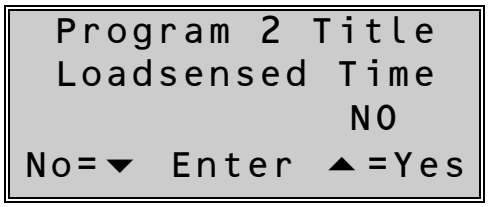
Press "Enter" to select that type.

Press ▼ or to ▲ scroll thro types

Each program can be associated with any of the available program types , eg
"Liquid loadA",
"Liquid loadB",
"Glass/Solids ",
" Waste Destruct "
" Media Warming ".

LOADSENSED TIMING ,

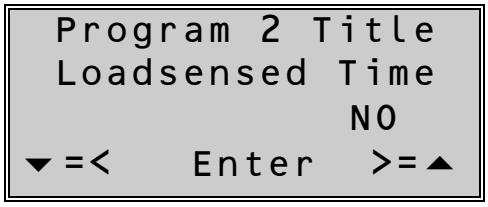
Note- this is Only present if load-sensed timing option is fitted and has been turned on in configuration.



Set On or Off as appropriate.

Press "Enter" to move on

1st line= Program Title
2nd line= parameter
3rd line= Yes or NO , current setting
4th line = set Yes or No and Enter



▲ =< ENTER <<= ▼

Press ▼ to move back and re-enter this value

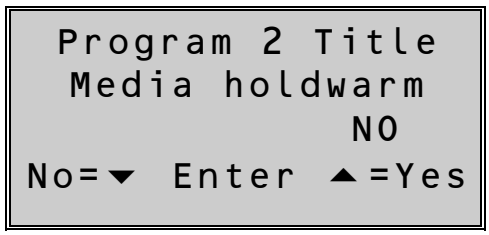
Press ▲ to move back one step to the previous entry

These key entries allow the correction of mistakes by stepping back and amending your entries as required

▲ ENTER ▼
followed by
▲ =< ENTER <<= ▼

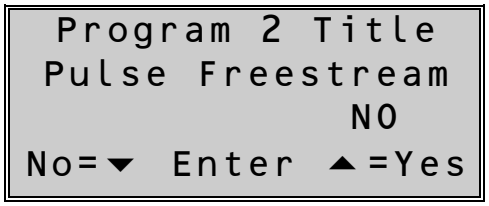
This Entry sequence is continued for each of the other parameters;...

MEDIA HOLDWARM
See explanation on Media Holdwarm.



Pulsar Freestream

Note- this is Only present if PULSAR FREESTEAM (pat) option is fitted and has been turned on in configuration.

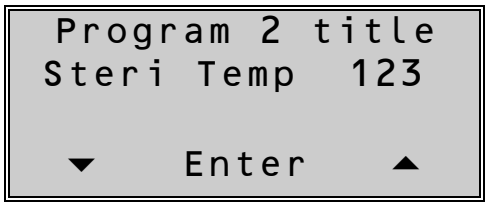


Other Options

Where other specialist options such as modes for HTM20/10 Compliance are available they will appear next in this sequence

Next the system allows you to set NUMERICAL VALUES Instead of On or OFF

SET STERILIZE TEMPERATURE



Press ▼ or to ▲ adjust in Deg C

Press "Enter" to select that value.

▲ ENTER ▼
followed by
▲ =< ENTER <<= ▼

This Entry sequence is continued for each of the other parameters;...

▲ to go BACK 1 entry

▼ to go BACK 2 entries

Press "**Enter**" to move on

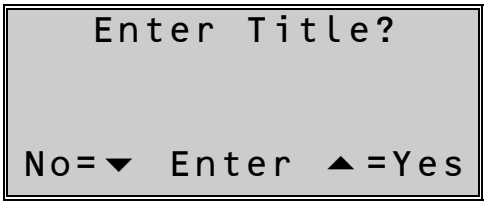
List of Parameters

PARAMETER	Max. value	Min value
Steri, temp STERI*LIZE* TEMPERATURE	**138C**	**50C ****
Steri, time STERI*LIZE* TIME	**1650 min**	**0 min**
PURGE TIME	**60min**	**3 min**
Cool Lock COOL LOCK *TEMP.*	**99C**	**30C**

Note that for a selected MEDIA WARMING (MEDIA MELTING) program the Sterilize temperature value sets the "PROCESS" temperature at which the chamber will be held for the set time, { because we are not actually sterilizing, but just warming or melting } .

eg Melt and hold at 80C.. requires this to be set to 80C

PROGRAM TITLE ENTRY

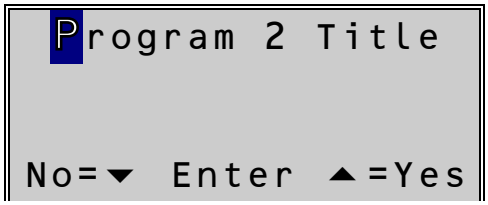


At the end of the Program Parameter Entry section the user is given the choice of entering or changing an alphanumeric **"TITLE"** for each program . The TITLE is displayed or printed to enable easy reference and identification of programs.

The Factory set titles may be changed to titles that suit the actual loads & processes.

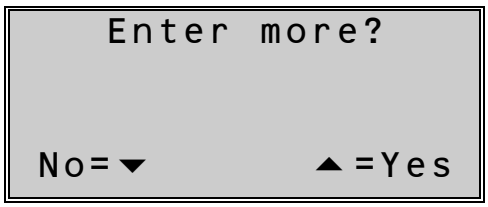
Each TITLE consists of 16 characters which are entered in sequence by using the "UP" & "DOWN" keys to scan through the alphabet, numbers, and punctuation.

The existing Title is shown on the top line, and each Character of the title is selected in turn and flashes when selected. . The character is changed using the UP & DOWN keys. Press the "ENTER" key to save that character and move to the next.



If the Title is less than 16 characters the balance of the 16must be made up with spaces.

When all have been entered there is a short delay while the title is stored.



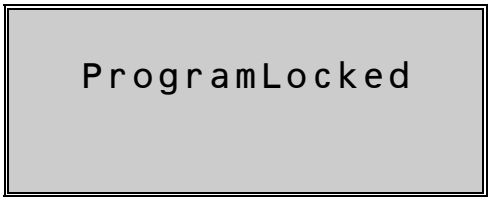
Press **No=▼** to return to **"READY" STAGE**

Press **▲ =**"Yes" to Enter More Programs

SELECTOR-LOCKED PROGRAM SELECTION

The **SELECTOR LOCK** may be set to prevent the Operator changing the Program selection. It is enabled in the User Configuration section .

When the OPERATOR tries to select a Program , then the Program will not change and the display will indicate Selector is "Locked".



If the **SELECTOR LOCK** is ON the SUPERVISOR must select the Program which will be run by the Operator.

To Change the program for the Operator

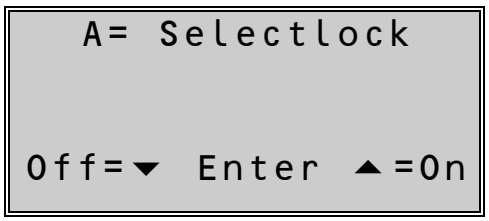
1 Go to SUPERVISOR LEVEL
2 Answer YES to Enter Program?
3 Select Program , step through parameters . You may change or leave them as they are.

This program will then be the one available toi the operator until this process is repeated for a different program.

USER CONFIGURATION

Some basic Configuration items are available to the Supervisor.

A Prog-Sel Lock
This is the Select-Lock . If ON only the supervisor may select Programs, via the KEY button & Pin No
See "Selecting a Program " for details.



Use the Up▲ and Down ▼ arrows to select
On or OFF
for this Config Item

The Rest of the USER Config. items are:-

B ABSPRESS
Absolute Pressure Display in stead of Guage .

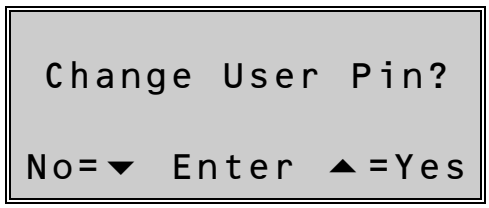
Ie atmospheric Pressure = approx 1.0 Bar abs.

C US-Format
Selects United States format for date and pressure in Pounds-per-sq.-in
If set to ON date = 14/08/97 = 14th August1997 , & Bar.
If set to OFF date = 08/14/97 = 14th August1997 , &PSIG

D 5C++ Boost?
If set to ON the Profiled Overshoot Boost system is enabled on ALL programs where Load Sensed Timing is selected.

E SPARE, NOT USED
Some versions have BeepInhibit ?
If set to ON this inhibits many of the BEEP sounder indications for those situations where the sound may be an annoyance . Warning sounds and Key-beeps are maintained

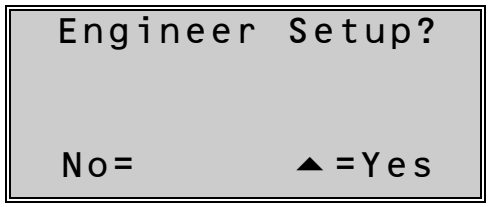
F StartDelay
The Start Delay allows a delay time to be entered each time the cycle is started, from 1-18 hours. For Example, this allows a load to be placed in the chamber in the afternoon, which will start automatically before start of work next day.
If set To "ON" , Start delay is active on all programs whenever the "START" Key is pressed.



Select YES to change the user Pin no to one of your own choice.

Use up/ down buttons to select Pin no .
Now WRITE IT DOWN!!

Press ENTER to save
& Move on



Select YES to go to Engineer Setup Mode
See section " Engineer Setup "

Press NO ▼
to return to
"READY" Stage

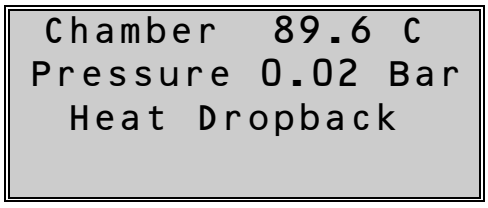
End of ENGINEER SETUP SECTION

FAULT DETECTION SYSTEM

TEMPERATURE DROPBACK

If the heat source fails during the course of the STERILIZE period then the chamber temperature will drop. When the Temperature falls more than a set value-, typ 2.0 C, below the SETPOINT

temperature the Sterilize Timer is reset and the system "idles" until the temperature recovers, at which point the timer restarts. This is intended to prevent Completion with Unsterilized loads in the event of Steam failure or Electrical Partial Supply Failure.



Machine function & Display reverts to normal when fault ceases, temperature rises again and conditions are restored.

The threshold level is adjustable & set in Calibration.

Please also See Load Sensed Timing

INTERLOCK FAILURE

The safe function of the Sterilizer is governed by a series of electrical and mechanical interlocks which are continually monitored and checked for correct operation by the microcomputer controller. In the event of a fault in this system that is detectable by the computer an INTERLOCK FAULT is reported.

INTERLOCK FAULT

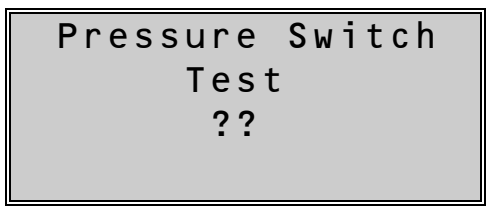
This shows that one or more of the safety and door interlocks are out of adjustment and require the attention of a qualified engineer.

PRESSURE SWITCH FAULT

The Safety Pressure switch detects pressure innthe chamber above about 0.15 Bar. And is responsible for preventing access to a pressutised chamber. It is sensitive and in the event of drift in setting, age or misuse may fail, normally failing to the “safe” mode.

If the pressure switch detects pressure at the start of the cycle when there cannot be pressure in the chamber then it will enter a test mode.

This displays as



The ?? counts up to 15 or 20 during this period the chmber is exhausted to atmosphere. If at the end of this the pressure switch is still reading pressure a FAULT is detected and the system goes into Fault report mode.

If the problem disappears in this period the system self- corrects back to normal operation.

FAULT REPORT

Faults are often intermittent and the system reports the condition of the interlocks when the fault happened. This report is provided on standard models by a series of displays on the LCD display. These should ideally be read by the operator and written down by the operator following the instructions on the display. If a Printer is fitted it will print out the FAULT REPORT automatically.

The report on the last fault that occurred is held in maintained memory. It is accessed via the Supervisor Mode described earlier.

The report should be retained and made available to the Service Engineer to make diagnosis possible.

Fault Report Information

The fault report supplies a snapshot of the machine at the time the fault occurs .

A document on how to diagnose and interpret this is available for download on request.

LOAD SENSED TIMING (Optional Extra)

All Sterilizer loads have Thermal Mass. This means that the load will ALWAYS heat up slowly compared tp the Sterilizer chamber. If this is not allowed for in timing or the profile, the load will not be subject to correct sterilizing conditions, ie it will be exposed to the set temperature for too short a time. Load Sensed Timing avoids this problem.

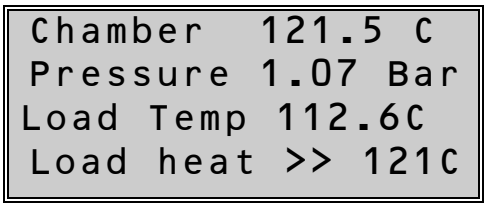
INSTRUMENT LOADS
Most “Instrument” loads are of fairly large surface-area/mass ratio, and will heat up following the chamber temperature fairly closely without the need for load sensed timing. Where a load is suitable for the insertion of a sensor, and the thermal mass is high compared to the surface area, then Load Sensing can be used.

MEDIA LOADS
Bottled-Fluid loads are of high mass and suffer from the slower heat-up . Load Sensed Timing is entirely suitable, and extremely effective in reducing this problem.

DESTRUCT/DISCARD / MAKESAFE LOADS
These are best sterilized WITHOUT Load Sensed Timing. The Profile should provide sufficient tolerance to ensure the cycle specification is achieved.

When Fitted as an option (No AAR014) , It must also be enabled in the Configuration.

LOAD SENSED TIMING is selectable (On/Off) within each Program. A temperature threshold is derived automatically within each Program equal to the Sterilizing Temperature set in that program. This Threshold is compared with the Temperature measured by the LOAD SENSING PROBE , the flexible wandering probe placed within the load , or in a
suitable “Load simulator”.

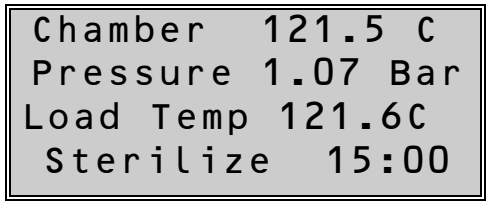


1st line shows Chamber temp
2nd line shows pressure
3rd line shows Loiad temperature
4th line shows Load is heating to the indicated target temperature.

During the “Load Heat >>” temp.” stage , the Chamber temperature is artificially boosted +2 C above the set sterilizing temperature .

The load sensor monitors the load as the temperature approaches the set Sterilizing Temperature .

When the load temperature equals the set Sterilizing temperature the boosted chamber temperature is reduced to just +0.3C above the set Sterilizing temperature.



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, There is no need to compromise or extend times to allow for the load to catch-up in temperature with the chamber. .....”

SPECIAL LOAD SENSORS

The Load sensor provided with this system is a 5mm Dia armoured flexible type “K” thermocouple. This may be too stiff or solid to use for some loads.

Alternative sensors with Clips and Attachments, and a variety of Load Sensors are available for special load requirements.

COOLING LOCK AND LOAD SENSED TIMING

Selection of the LOAD SENSED TIMING function in a program also implements a LOAD SENSED COOLING LOCK for that program . 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.

HEAT "DROPBACK" WITH LOAD SENSED TIMING SELECTED .
The Dropback action and display, etc operate as described for the standard machine.

In addition, if the LOAD temperature itself drops a further nominal 2 Deg. C below the threshold once sterilizing has begun this will also trigger the DROPBACK detection , and the Sterilizing Timer will restart. as for the standard Dropback action. The extra 2 Deg C below the threshold allows for the fact that the temperature control is cyclic and this can cause false DROPBACK detection if the load responds to the temperature fluctuations.

PROFILED OVERSHOOT BOOST

This Astell - developed system gives PROFILED OVERSHOOT.

Where a Load Sensed Timing option- (sales part. no AAN014) is fitted it may be selected in any one of the Program Profiles.

Where L.S.Timing is selected, "ProfiledOvershoot Boost " may be selected.

Note that this system is Active Only if Load Sensing has been selected for a particular program.

It must also be set ON in Configuration- see " 5++C Boost " page 49

Explanation Of Profiled Overshoot

Alternative systems of Load Sensed Timing are compromised by the fact that due to calibration and performance tolerances and offsets, the temperature threshold which starts the cycle timing cannot be closer to the chamber setpoint set for the process , than approx. 2 C for reliable operation.

The Astell "PROFILED OVERSHOOT" avoids this by dynamically changing the setpoint temperature automatically in a series of profiled stages to match the temperature of the load heating up. This achieves a threshold temperature exactly the same as the Sterilizing temperature and a further function compensates for the small temperature offset between load and chamber during Sterilizing experienced in normal use. This system is integral with and dependent upon the use of the Load Sensing system.

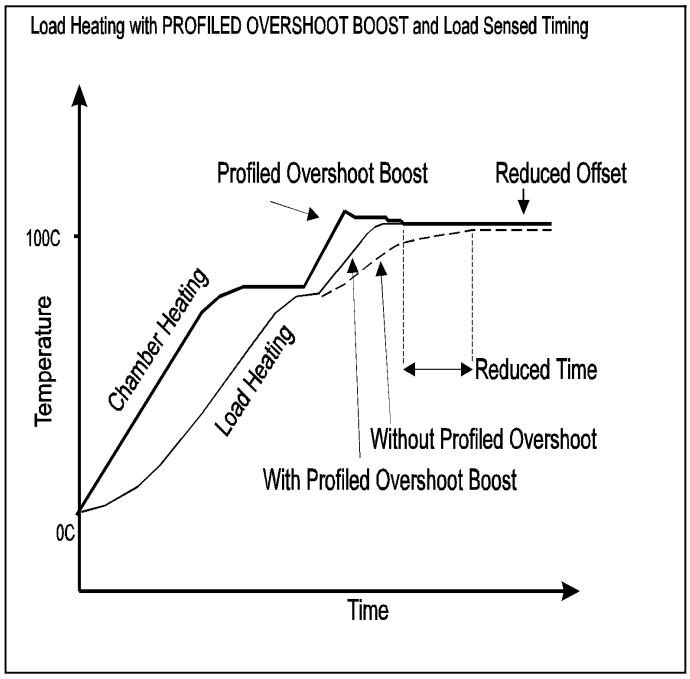
Technical Description- PROFILED OVERSHOOT BOOST

During the "Load Heating To Temperature" stage , the Chamber temperature is artificially boosted +5 C above the set sterilizing temperature .

The load sensor monitors the load as the temperature approaches the set Sterilizing Temperature(5 C below the boosted chamber temperature at this point. Since load heat-up rate depends upon the difference between load and chamber temperatures this increases the rate of heatup of the load by a significant and useful factor. When the load reaches 1.5C below the set Sterilizing temperature the boost in chamber temperature is reduced to +2C.

When the load temperature equals the set Sterilizing temperature the boosted chamber temperature is reduced to just +0.3C above the set Sterilizing temperature.

Because of the increased temperature differential between load and chamber, the load heats-up much faster over the last few degrees. If the Boost was left at a high level, the Load temperature would significantly overshoot the desired temperature. By gradually reducing the boost as the load gets nearer to the desired temperature , it does not appreciably overshoot the desired setting. Also, since it is in the nature of the thermodynamics of the design , that during the Sterilize Stage heat transfer into the load causes the chamber to be typically 0.5C above the average load temperature, the sterilize Temperature is subjected to a 0.5C l boost during the Sterilize Period, which helps to offset this difference.



INTERNAL PRINTER OPTION POD-MOUNTED VERSION

The printer option prints on 58 mm wide paper using an inked ribbon and records information that is also available from the LCD display. A REAL-TIME-CLOCK is provided, with battery maintenance for typically 28 days.

Configuration Note-set the following
The Printer Type a =on
The Printer Type b = on

For best operation use only Astell Scientific Supplied paper and ribbons

OPERATION OF PRINTER

Please note that the print is not visible immediately after printing since the point at which the printing occurs is inside the case & hence out of view.

PRINTER PAPER-FEED
Press the "PAPER FEED" key on Control-Panel

PAPER TEAR-OFF
Press the "PAPER-FEED" Key to move the paper end up a little if needed. This is also useful to check that the paper is feeding properly.

Hold the end of the paper firmly and pull gently away from the face of the control panel to tear the paper off on the serrated edge. Do NOT drag the paper vertically out of the printer !!!

LOADING FRESH PAPER

Incorrect loading causes many expensive service call-outs. Please ensure that the paper loading method described here is used . Do not tear-all-ways 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.

ACCESS TO PRINTER MECHANISM

The front panel hinges at the side and is held closed at the other side by a spring catch
Release the front panel by depressing this catch and hinge the panel sideways.

PAPER ROLL HOLDER
Cut the end of the new roll with scissors cleanly across at an angle as shown Do not tear across the paper , or cut to a point as this will make it difficult to feed in the paper..Remove remnants of the old roll and the old cardboard roller centre. Load the paper roll to the holder so that the paper exits the roll as shown in the following drawing

Feed the end into the inlet slot at the rear of the printer assy. facing the paper roll . Hold the paper gently but firmly in the printer slot & Press the "Paper Feed" Key until paper emerges at the top of the printer.

CHANGING RIBBON

The Printer Ribbon is the small black L-shaped cassette that sits above the paper inlet slot.
To fit the ribbon first be remove paper from the printer
Cut paper between printer and paper roll across @ 10-20 degrees, as detailed above.

1) Press "PAPER FEED " until all paper has been ejected from the printer mechanism. Do not pull paper out by hand.
2) Grasp the Ribbon Cassette at the ends and Lift off the mechanism.
3) 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.
4) Place the New Ribbon Cassette in position over the mechanism. Press the Larger end with the Wheel down gently until the clutch engages.
5) Press "PAPER FEED " for 5-10 seconds to align the ribbon in the slot. The ribbon should be neatly in the slot provided. If the ribbon is distorted and above the slot, remove & retension the ribbon and repeat the fitting.
6) Re-load the paper as described above.

PRINTER PROBLEMS

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

The Paper end MUST be cut cleanly at the illustrated angle or it may tear , jam, and clog the printer mechanism

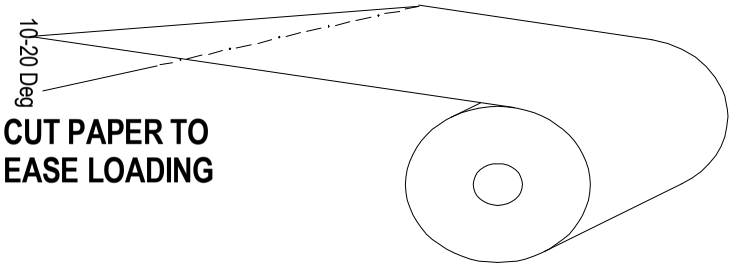
Ensure paper roll is fitted correct way up. (Paper feeds off the TOP of the roll.)

Ribbons must be fitted with the ribbon correctly seated in the slot.

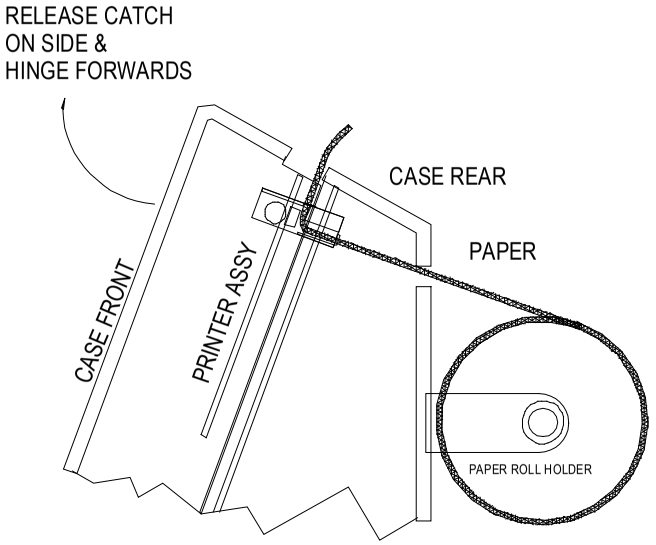
Installation of paper to the printer is outside the manufacturers control. Service calls during the warranty period which (in view of the manufacturer or agent) are caused by the incorrect type, use or fitting of paper , may incur service charges.

DRAWING No. 840-260	ISSUE No. 02	TITLE INTERNAL PRINTER PAPER LOADING -	A4 elec

pod mounted
internal printer



CUT PAPER TO EASE LOADING



NOTE;- DIRECTION OF ROTATION ON PAPER ROLL. FITTING THE OTHER WAY WILL IMPEDE OPERATION AND PAPER FEEDING

DRAWN BY	DATE	STORES PART No.	ISS	DATE	MODIFICATION	MR No.
JAS	280900		01			3260
CHECKED BY	DATE / /	Similar To / See Also				
ISSUED BY	DATE / /	DERIVED FROM				

CASE MOUNTED INTERNAL PRINTER

This is similar to the Pod-Mounted printer but is mounted in the front face of the case of some models in stead of in the control pod.

Please see additional Astell manual for your Printer.

Configuration-
PRINT TYPEA =off
PRINT TYPEB =off
(epson APSL40-v 40 character)

REMOTE / EXTERNAL PRINTER OPTIONS

This is Either
2-colour printer option using 58 mm wide paper using an inked ribbon .
Or **A Monochrome printer** similar to the internal model. Pleas see other manual supplied.
It records information in exactly the same manner as the Internal printer option.

For details of Paper handling, ribbon replacement, etc please see the Printer manufacturer's manual supplied with the machine.

Note- The PAPER FEED button on the Membrane front panel will not work for this printer- use the Button on the printer itself.

Configuration Note
In configuration set the following

Printer drive differences for printers
Config variables PTYPEA and PTYPEB

printercode =0
= PRINT TYPE A off B off = epson APSL40-v 40 character

printercode =1
= PTYPE A on & B off = CITIZEN IDP562 FREESTANDING printer

printercode =2
= PTYPE B on & A off = asl890 printer

printercode =3
= EPSON STD ORIGINAL 20 CHAR

CHART RECORDER (OPTION) AUTOMATIC POWER SWITCHING

The Chart Recorder options fitted to Swiftclave Sterilizers are automatically switched on and off during the cycle to reduce paper wastage.

ON at the start of the cycle. , OFF when the COMPLETE stage is reached.

The power can also be switched on and off when in the "SUPERVISOR " stage. This is useful for testing or to allow the paper to be changed on Circular Chart Recorders which have a motor driven Pen Lift Mechanism.

Please see reference to this in the earlier section

Separate Astell Scientific Manuals are supplied when a Chart Recorder option is specified giving details of recorder operation and specifications . A copy of the original Manufacturers Manual and literature is also provided .

ASTELL AUTOSCRIBE DATALOGGER(OPTION) Automatic Logging Control

The AUTOSCRIBE DATALOGGER options fitted to Swiftclave Sterilizers are automatically switched to log & record the operating cycle without wasting storage space on the between-cycle measurements.

Logging Starts at the start of the cycle. , and stops when the COMPLETE stage is reached.

The logging can also be switched on and off when in the "Supervisor " stage. This is useful for testing.

Separate Astell scientific Manuals are supplied when AUTOSCRIBE Datalogger is specified giving details of operation and specifications . Software and connector leads are provided for use with the host PC computer.

ENGINEER SETUP LEVEL

The basic functions of the controller are set up in the ENGINEER LEVEL.

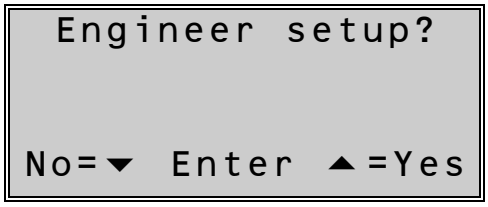
Warning .;- The Engineering level may involve contact with the electronics of the controller and as such renders the system liable to static electricity and damage by mechanical or other causes. It is intended to be used only by qualified engineers who have been shown how to perform such adjustments by the manufacturer's agent, or who are carrying out such adjustments on behalf of or under the instruction of the manufacturer. Any damage ensuing from unauthorised access to this level may be outside the scope of the warranty provisions.

The Engineering Level is accessed from the SUPERVISOR LEVEL.

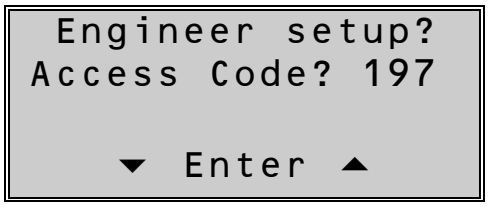
ENABLING ENGINEERING MODE
Access to ENGINEERING mode is controlled by the Access PIN number code or alternatively by setting of a switch on the main PCB

1) PIN number access

Use the KEY button to access the “SUPERVISOR" mode , and step through the Supervisor questions. When display shows



Answer “Yes”



Change the 197 to the ENGINEER Access code PIN number .
Then Press ENTER
(The Pin Number is fixed in the factory.)

If unsure please consult ASTELL for the number for your machine

EXITING from ENGINEERING MODE
At the end of the Engineering entries the Engineering mode will be re-entered until the displayed

EXIT ENGINEERING?

Answer "YES".

ENGINEER SETUP FUNCTIONS

CONFIGURE
Allows Configuration of system

TEST-ENGINEERINGING
Allows various tests on the system components
The First item is CONFIGURATION

The User Configuration session is shown earlier in this manual. The higher levels of configuration

ENGINEER CONFIGURATION

You will need to enter the CONFIGURATION PIN access code which is normally the same as the ENGINEER PIN access code

I BallastCool
This enables the Air Ballast cooling system
(special extra equipment is required)

J Mediaholdwarm
This enables the Media Holdwarm function

K LS TIME ?
This tells the system that the LOAD SENSE TIMING option is fitted.

L Pulse F/S ?
On Astell autoclaves this enables the PULSAR AIRPURGE function .
(special extra equipment is required)

M Venting-Wwater
This enables the special HTM2010 system that discharges all water at the end of the cycle.
(special extra equipment is required)

N Elecheat
This enables the system for internal Chamber-mounted heaters

O GENSTEAM
This enables the system controller for a built-in steam generator.

P Autofill
This tells the system that the Autoclave Mains Water Automatic water Fill system is fitted.
(special extra equipment is required)

Q Purgechk Astell system for checking if the air purgeing is adequate.- consult Astell before use.

R ProgLock
Selects whether Parameters are locked against user/supervisor alteration.

CALIBRATION
Allows calibration of Temperature & Pressure sensors and other settings

Set to ON to lock parameters of Program Profiles for Engineer changing only.
Set to OFF for normal access to change program profiles

S Recorder?
When set to ON this means that an Astell Chart Recorder or Datalogger is fitted, and allows the auto power switching to operate.

AA= PrintrFitted
Enables output to one of the specified printers.

BB= Spare

CC= Printcode A

DD= PrintCode B
These two items Printcode A,B are used together to define 4 different specifications of printer.

EE= ExtData
Enables external RS232 Data output

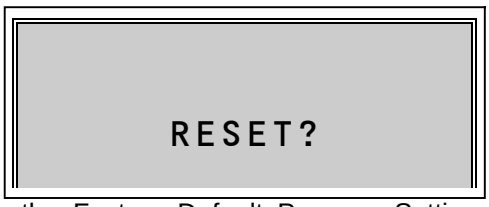
FF P-9600Bd
Enables 9600 Baud to printer in stead of std 2400 baud.

GG Serdata@P0
Sends serial data to printer port 4

This is the end of Configuration entries.

The next display is ;-

If the [KEY] is pressed whilst this display shows,



then the Factory Default Program Settings and titles will be written into the EEPROM permanent memory of the controller. These will wipe any settings previously entered by the user. Use only if you are totally sure that you wish to reset program settings.

Warning !!

Incorrect configuration may cause damage to the control system .

Do not alter configuration settings without a full understanding of the implications and effects of the changes. If in doubt consult ASTELL or your local agents.

TEST - ENGINEERING - MODE

The functions in this mode are intended for service engineer use

```
INPUTS   CPLUSOTG
State    11000100

[Enter] to close
```

Press "ENTER" Key to move to next stage....

The display shows state of interlock switches and sensors. The Top line shows 1 for ON state , 0 for OFF state, corresponding to the letters on the second row

O	**"Open" microswitch contact on Door**	**1 = open**
S	**"Shut" microswitch contact on door**	**1 = shut**
U	**"Unlocked" microswitch contact on lock mechanism**	**1 = u/locked**
L	**"Locked" microswitch contact on lock mechanism**	**1 = locked**
C	**"Preset" Cool Lock Thermostat**	**1 = low Temp**
P	**Pressure Switch interlock**	**1 = low Pressure**
G	**AUX Reserved for future use**	
T	**Tank Floatswitch**	**1 = low Water**

Note that some sensor output states are interdependent due to the DOUBLE-LEVEL interlock system which provides a chain of independent interlocks that do not involve the Microprocessor system.

FORCE OUTPUTS

This is for testing the output actuators /valves/etc. It allows the output relays to be forced to ON or OFF, for Example, this is the BOLT relay;-.

```
RELAYS
rec          OFF/ON

OFF=▼ Enter ▲=ON
```

Use the Up/Down buttons to turn the output on/off

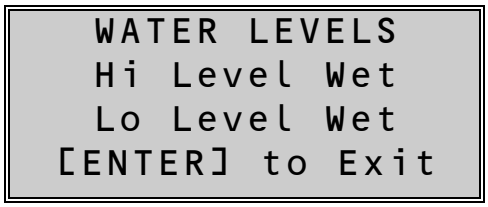
Use the ENTER buttons to step on to the next output

RELAY OUTPUT LIST

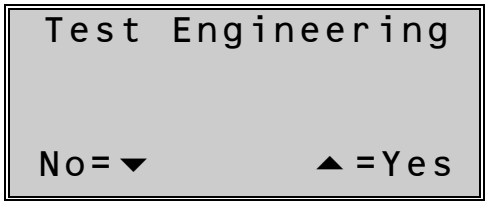
Rec	**Recorder Power Switching** **&** Datalogger Remote control volt-free relay
Heat	**Heater Contactor /Valve** Contactor on 3Phase , Sol-Valve on Steam Heat Supply.
PMS	**Either** Steam generator heater Or HTM10 pumpout
Blow	**Either** Ballast Solenoid Val**ve** OR Steam Gen Feed Pump
Fill	**Water Solenoid Valve** Feeds water to chamber.
Cool	**Cool Fan or Water Cool valve or Pump**
Vent	**Solenoid valve** Exhaust Vent valve
Bolt	**Locking Bolt Solenoid**

WATER LEVELS

WET/DRY Chamber Water Level Sensors

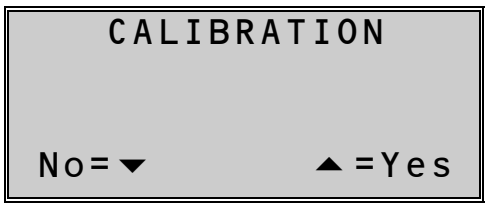


Press EXIT to move on



The Test Engineering routines may be repeated as many times as necessary

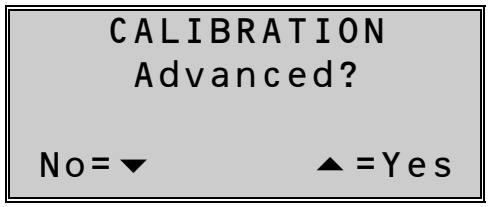
The Next display is



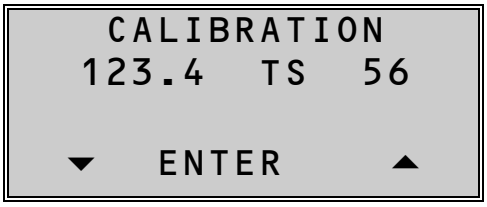
Press **YES** to enter Calibration Mode.
You will be asked to confirm your choice
.to perform calibration.

CALIBRATION

The Calibration of the system requires special instruments and should not be attempted without a full understanding of the system and what calibration involves. Further information is given in the ASTELL SWIFTCLAVE CALIBRATION INSTRUCTIONS available on request.



WARNING
Unless you are to calibrate the advanced features , which is normally factory only, press NO



Here "TS" is the Temperature Span Parameter. 123.4 is the measured value of the sensor being Calibrated
Note "ZERO" means "Range Zero" not a value of 0 .In the example above "56" is the 'OFFSET' with a +ve or -ve value. This "Offset" value is used for record purposes and is the correction value used by the control computer. It is the equivalent to the graduations on a calibrated dial and allows the reproduction of calibration settings.

3RD points are additional calibration points- See Below

TZ	Chamber Temperature Zero
TS	Chamber Temperature Span
TX	Chamber Temperature 3rd point above 120C
PZ	Chamber Pressure Zero
PS	Chamber Pressure Span
PX	Chamber Pressure 3rd point below ambient
LZ	Load sense Thermocouple Sensor Zero
LS	Load sense Thermocouple Sensor Span
LX	Load sense Thermocouple 3rd point above 120C

Pressing UP or DOWN will change the OFFSET value and this will change the indicated sensor Measured Value, as the controller continually recalculates the Value to be displayed. The Filter system means that there is a 5 second delay before the reading stabilises.
The OFFSETS may be recorded on a label in the case front inside .

The calibrated value follows the equation ;-
Displayed value = ((M x sensed value) + C x X)

M = (K x the Span-Offset) and C = (L x the Zero-Offset) . { K and L are constants.}
X is the 3rd point factor.

In the case of the 3rd points-

For Temperature the figure modifies the slope of the curve above 120C. This allows a correct calibration at 120C and at say 134C even if the calibration of the chamber is non-linear due to heat losses.

For Pressure, the 3rd point value changes the slope for pressures between 0 and 1000 mBar Abs or below 0 barG.

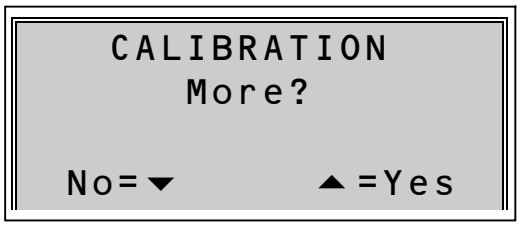
The 3rd point values offere a very fine adjustment .

Press "NEXT" to step to the next parameter in the list .

At the end there is a delay as the new values are stored in permanent memory.

Additional Calibration Parameters

Following the Instrument Calibration, parameter values required for the cycle are entered.

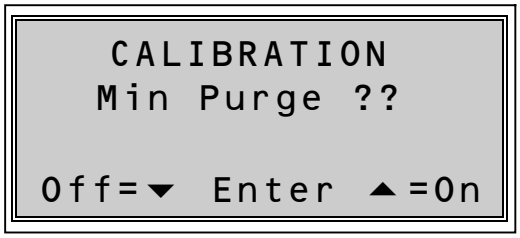


COOLING START

This is the temperature (Deg C) at which the Fast/Assisted Cooling System starts. The chamber cools down naturally to this temperature, then the Cooling is activated. Min:= 90C, Max:= 135C.

It is typically Set to 100C . Setting a higher temperature will speed up cooling but will increase boling-over and loss of the load contents on Bottled Fluid Loads, e.g. Media.

Min Purge Time



This is the minimum value that the airpurge time can be set to. It depends on chamber size and spec, to ensure there is always a suitable amount of airpurgeing.

FREESTEAM START TEMP

This is the temperature at which the system switches stage to the Airpurge . the sytystem will not proceed until the temp exceeds this setting. It is dependant upon altitude. Standard setting is 97-98 C at sea level. To set- set 2C below the temp at which water boils at the installed site.

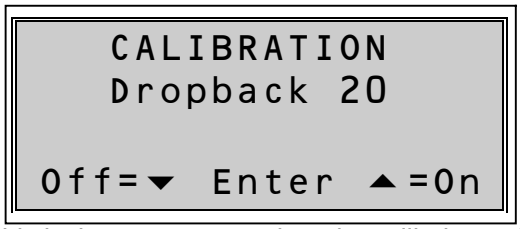
WET LEVEL

Set this to the resistance value required for the water level sensors. Typical = 100. Max= 150 min

= 10
Adjust this to permit correct detection of water for available water quality. Hard water = low value soft water = High value.

DROPBACK LEVEL

Set to the Dropback threshold in 1/10 Deg increments ie 20 = 2 deg C. Typical =20.



This is the temperature drop that will trigger the Dropback fault sytstem. Max = 5C min = 1C

LOG TIME

Set to the log time INTERVAL for printing, in seconds. This controls the interval during Airpurge

and Sterilize periods.

Calibration service int

Please do not attempt to change this without consulting service dept.

THIS COMPLETES CALIBRATION MODE

At the end there is a delay as the new values are stored in permanent memory.

YOU CAN THEN CHOOSE TO RUN CALIBRATION AGAIN OR EXIT CALIBRATION

"RUNNING" CALIBRATION

The Calibration of the system may be corrected or adjusted when the system is actually operating in a cycle.;-. (Running Calibration is not available in all operating stages.)

To make Running Calibration available you must enter ENGINEERING SETUP mode (It is not necessary to change anything – just enter and exit.). Once you exit ENGINEERING SETUP, running Calibrate will be available **until the power is turned off.**

With the chosen program running, operate the **[Key] and [Clock]** buttons together to enter **Running Calibration Mode**;- The Calibrate system then operates as described earlier. During this period the Timing functions continue to run and the Temperature Control system will operate as normally but TIMES will not be visible to the operator until the Calibrate Mode has been left. . Note- extra adjustments are available- it is possible to change the setpoint whilst running and /or change the sterilize time.
When the last Calibrate value is entered , Control will return to the normal Program.

CYCLE PROFILE EXAMPLES

The Profiles that follow represent typical Cycles as may be supplied Factory-Set.

These cycle profiles are given as illustrations only. Actual cycles that are required for particular loads may well differ from the ones shown here. Consult the associated Sterilizer manual for details of setting up the sterilizer for your particular requirements

Each of the Controller Sequences associated with special features of the profiles are covered in detail at the end of this section.

FLUIDCYCLE
123deg C for 15 Minutes
10 Minutes AirPurgeing,
80Deg C Cooling Lock

MEDIA MELTING CYCLE
100deg C for 30 Minutes
5 Minutes AirPurgeing,
80 C Cooling Lock
with Holdwarm @ 55C.

MAKESAFE / DISCARD CYCLE
134deg C for 30Minutes
10 Minutes AirPurgeing,
80Deg C Cooling Lock .

FLUID (MEDIA) CYCLE

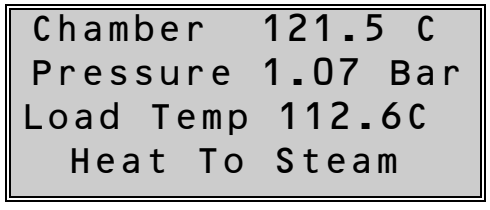
123deg C for 15 Minutes
10 Minutes AirPurgeing,
80Deg C Cooling Lock

Select and Start the cycle

Throughout the cycle the display shows Temperatures, Times, and other cycle stage information. The stages are as follows ;

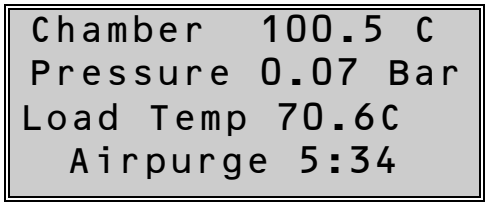
HEATING TO STEAM

When approx. 100 C is attained the AirPurge



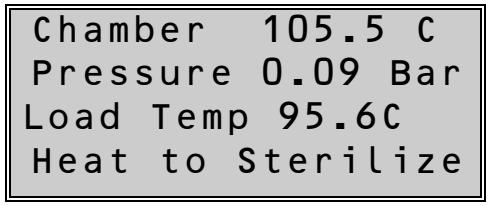
Period begins....

AIRPURGEING



The Time counts down in Min & Secs to show AirPurge Time Remaining.
(Here the AirPurge time was set to 10 Min., now 5:34 sec. remain)

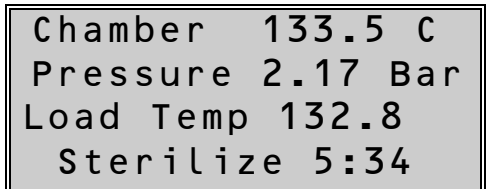
HEAT TO STERILIZE



When Sterilizing Conditions are reached the Sterilize Period begins .

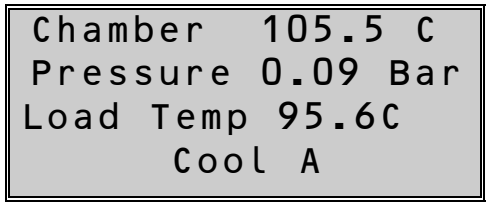
LOAD HEATING TO TEMPERATURE and OVERSHOOT BOOST options/settings
See LOAD SENSED TIMING ; Page xx
PROFILED-OVERSHOOT BOOST; Page xx

STERILIZE PERIOD
The temperature and pressure will fluctuate within



+/-1 Deg C as the system controls at the set temperature. The time counts down in Min & Secs showing the Sterilize time remaining.

COOLING

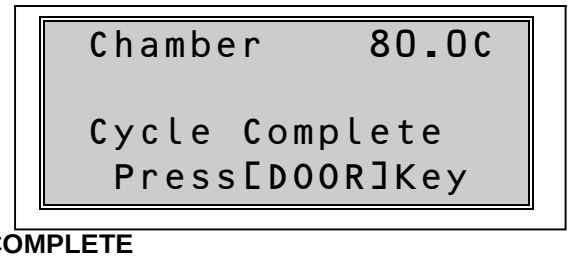


The system starts to cool down. Steam Pressure drops . The slow reduction reduces boiling over of media. The system cools NATURALLY to typically 100C , then Assisted Cooling begins.(If Load Sensed Timing is fitted and selected , this is the temperature in the load .) ***The Cooling Start temperature is set in Calibration - see page 48 .***

Media Cycle… cont.

COOLING LOCK TEMPERATURE REACHED

When the Completion Conditions are met as described above;-



COMPLETE

The "Complete" stage occurs when following conditions are met ;-

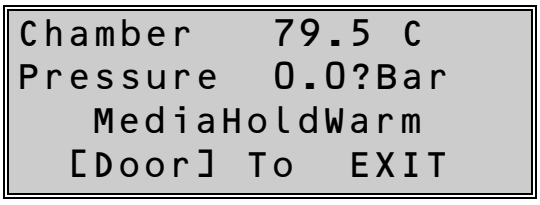
a] Pressure is less than about 0.15 bar

b] Temperature of the CHAMBER is below the Programmed Cool lock Temp.
or; If Load Sensed Timing is fitted;- The Load temperature is below the Programmed Cooling Lock Temp. (See Page 34)

c] Temperature of the COOL LOCK Thermostat sensor on the chamber wall is below the set cool lock temperature .

HOLDWARM

If selected the Complete stage is immediately followed by the Holdwarm Stage



TO STOP HOLDWARM Press **[OPEN] key**

This goes to COMPLETE- SEE ABOVE

MEDIA MELTING CYCLE

100deg C for 30 Minutes 1 Minutes AirPurgeing, 80Deg C Cooling Lock Assisted Cooling .and Holdwarm @ 55C

Select and Start the cycle

Throughout the cycle the display shows Temperatures, Times, and other cycle stage information. The stages are as follows ;

HEATING TO STEAM

```
75.6 C
0.0? Bar
Heating To Steam
```

When approx. 100 C is attained the AirPurge Period begins....

AIRPURGEING

```
100.4 C
0.01 Bar
Freesteam  4.34 min
```

The Time counts down in Min & Secs to show AirPurge Time Remaining.
(Here the AirPurge time was set to 5 Min. , with 4min,34 sec. remaining)

HEAT TO STERILIZE

```
100.1 C
0.?? Bar
Heat to Sterilize
```

When Sterilizing Conditions are reached the Sterilize Period begins .

LOAD HEATING TO TEMPERATURE and PROFILED OVERSHOOT BOOST settings
See LOAD SENSED TIMING ; Page 35
OVERSHOOT BOOST; Page 36

STERILIZE PERIOD

```
100.1 C
0.0? Bar
Sterilize 12.34 m
```

The temperature and pressure will fluctuate within +/-1 Deg C as the system controls at the set temperature. The time counts down in Min & Secs showing the Sterilize time remaining.

COOLING

```
100.4 C
?.??Bar
Cool A
```

The system starts to cool down. Assisted Cooling begins.at typically 105C (or as set in Calibrate)
If Load Sensed Timing is fitted and selected , this is the temperature in the load
The Cooling Start temperature is set in Calibration - see page xx

COOLING LOCK TEMPERATURE REACHED
When the Completion Conditions are met as described above;-

COMPLETE

The "Complete" stage occurs when following conditions are met ;-

a] Pressure is less than about 0.15 bar
b] Temperature of the CHAMBER is below the Programmed Cool lock Temp.
or; If Load Sensed Timing is fitted;- The Load temperature is below the Programmed Cooling Lock Temp.
c] Temperature of the COOL LOCK Thermostat sensor on the chamber wall is below the set cool lock temperature .

HOLDWARM

If selected the Complete stage is immediately followed by the Holdwarm Stage

```
Chamber   79.5 C
Pressure  0.0?Bar
   MediaHoldWarm
  [Door] To  EXIT
```

TO STOP HOLDWARM Press **[OPEN] key**

This goes to COMPLETE- SEE ABOVE

134deg C for 7 Minutes , 8 Minutes AirPurgeing, Assisted Cooling, 80Deg C Cooling Lock .

Select and Start the cycle

Throughout the cycle the display shows Temperatures, Times, and other cycle stage information. The stages are as follows ;

HEATING TO STEAM

```
75.6 C
0.00 Bar
Heat To Steam
```

When approx. 100 C is attained the AirPurge Period begins....

AIRPURGEING

```
100.4 C
0.01 Bar
Airpurge 7.55 m
```

The Time counts down in Min & Secs to show AirPurge Time Remaining.
The water reservoir supports AirPurgeing up to 35 minutes in duration.
Here the AirPurge time was set to 8 Min , 7min55sec left.)

HEAT TO STERILIZE

```
123.4 C
?.?? Bar

Heat to Sterilize
```

When Sterilizing Conditions are reached the Sterilize Period begins .

LOAD HEATING TO TEMPERATURE and PROFILED OVERSHOOT BOOST settings
See LOAD SENSED TIMING ; Page 35
OVERSHOOT BOOST; Page 36

STERILIZE PERIOD

```
134.5 C
?.?? Bar

Sterilize 6.34 m
```

The temperature and pressure will fluctuate within +/-1 Deg C as the system controls at the set temperature. The time counts down in Min & Secs showing the Sterilize time remaining.

COOLING

```
120.4 C
?.??Bar
Cooling A
```

The system starts to cool down. Steam Pressure drops . The slow reduction reduces boiling over of media. The system cools NATURALLY to typically 100C(or as set in Calibate) , then Assisted Cooling begins. If Load Sensed Timing is fitted and selected , this is the temperature in the load .

COOLING LOCK TEMPERATURE REACHED
When the Completion Conditions are met as described above;-

COMPLETE

The "Complete" stage occurs when following conditions are met ;-

a] Pressure is less than about 0.15 bar
b] Temperature of the CHAMBER is below the Programmed Cool lock Temp.
or; If Load Sensed Timing is fitted;- The Load temperature is below the Programmed Cooling Lock Temp.
c] Temperature of the COOL LOCK Thermostat sensor on the chamber wall is below the set cool lock temperature .

Press the [OPEN] Key , Unlock and Open closure.

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 Sterilizers only.

Pressure Bar	Temperature Deg C	Temperature - Min Temp	Tolerance 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 & 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.

SPARE PARTS AND SERVICE

When ordering spare Parts or requesting Service Assistance please have ready the SERIAL NUMBER to be found on the RATING PLATE at the rear of the machine.

Use only approved ASTELL SCIENTIFIC spare parts , available from the ASTELL service department . Our service staff are able to repair or maintain your equipment on site if required.

Note that 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. Directives and will void the CE mark. Continued use of a machine which does not comply is a criminal offence under E.C. / E.U. law.

For SALES, PRICES AND INFORMATION
Contact ASTELL SALES DEPARTMENT

For SERVICE And SPARE PARTS
Contact ASTELL SERVICE DEPARTMENT

For TECHNICAL SUPPORT
Contact ASTELL DESIGN DEPARTMENT

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