

SciCan Euro Short Case Type B 16 Litres

Service Manual



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Issued 15/04/04

Amendment List

	Issue	Issue Date	Incorporated by	Signed	Date
1	Initial issue	15 April 04	Rob Stevenson	<i>R/S</i>	15/4/04
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Forward

The product has been designed to allow full testing of all functions, including calibration, from the front panel. Full use should therefore be made of these facilities before removing any cover plates or the rear case.

Before starting any repair, obtain a full history and description of the reported fault. Start by ensuring that all general maintenance procedures have been carried out successfully as per the operating instructions.

Spare parts kits are stand alone items and do not include components such as decals, grease, RTV silicone etc. these should be ordered separately.

The pressure vessel is a high integrity component, the lid and associated brackets, extrusions etc. should not be removed, if required, the whole vessel assembly should be replaced. Due to the nature of the design, the boiler, chamber probe housing and air bleed fitting may be changed and then subject to a single pressure test using engineering mode Eng 01 (Pressure release valve lift test.)

Use only genuine spare parts as provided by SciCan. Use of other parts may cause product failure and invalidate the warranty.

If in doubt, call SciCan direct for assistance.

NOTE:

- (1) This document is the copyright of SciCan and may not be copied to any other parties without the written authority of SciCan.
- (2) This document was first issued with all pages at Issue 1 on the 01/09/03.
Any revisions will be indicated on the amendment list (page2) together with the date of the up issue, an attachment will show the affected pages.
- (3) Insulation resistance and earth continuity should be checked before placing unit back in service after a repair.

Technical Specifications

	32035100	32032100						
Height in mm	410	410						
Length in mm	440	560						
Width in mm	480	480						
Weight in kg	42	43						
Chamber diameter in mm	250	250						
Chamber length in mm	330	430						
Capacity in litres	16	22						
Sterilizing temperature °C	121/134	121/134						
Sterilizing time in minutes	4/16	4/16						
Operating pressure in bar	2.05	2.05						
Voltage	230	230						
Wattage	2200	2200						
Frequency Hz	50	50						

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Chapter 1

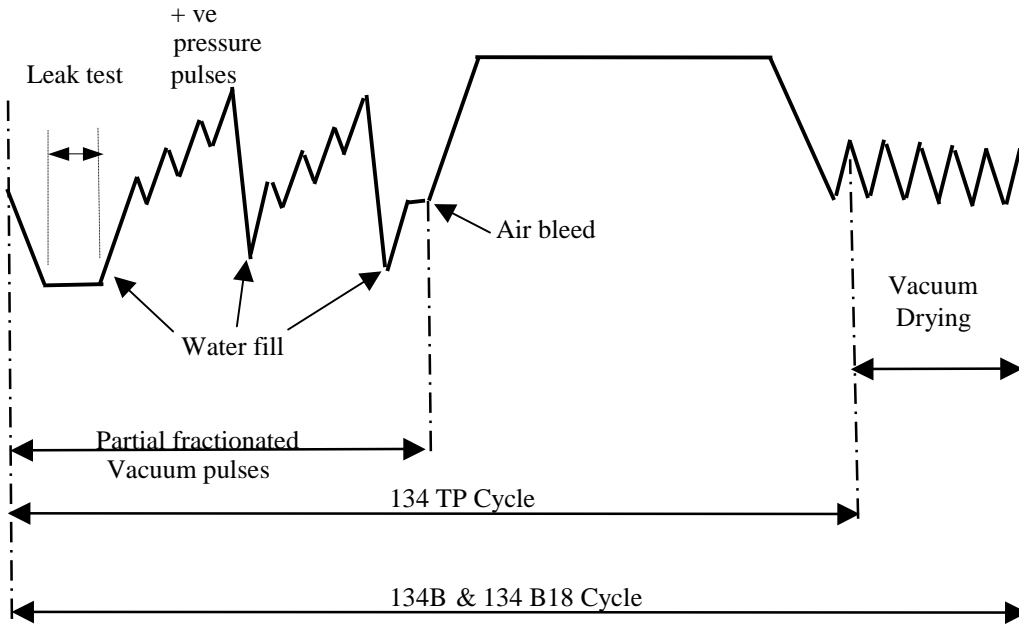
Cycle Options

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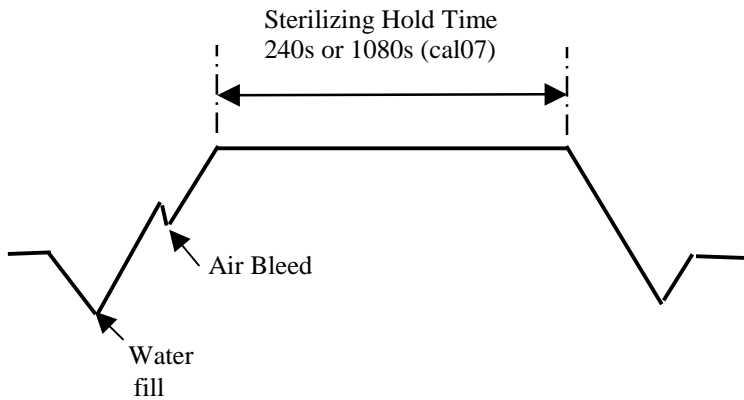
Cycle Stages pre & post vacuum

Triple Pulse Fractionated Pre Vacuum Drying

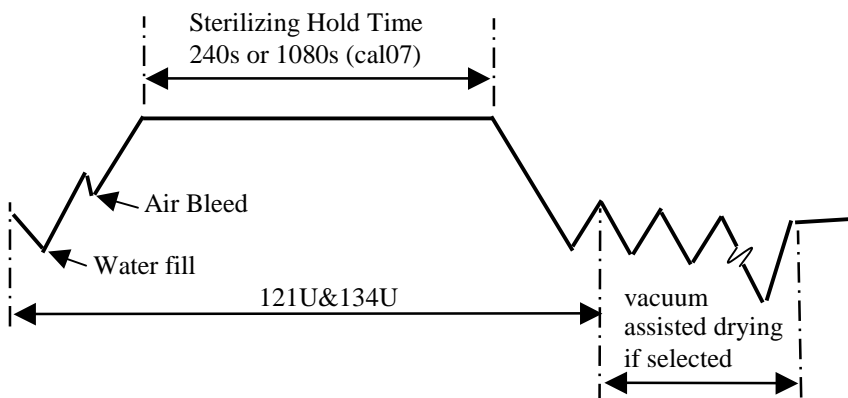
- | | | | | |
|------------------------------|------------|---|---|-------------|
| 1. Pre Vacuum/
Water Fill | 2. Heating | 3. Sterilizing Hold Time
240s or 1080s (cal07) | 4. De-Pressurise/
Vacuum / Drying
(if selected) | 5. Complete |
|------------------------------|------------|---|---|-------------|



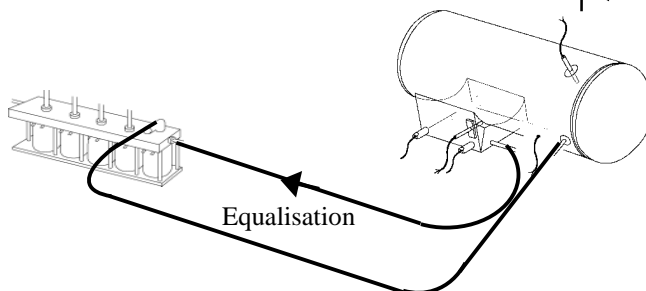
Single Pulse Pre Vacuum (134S Cycle)



Solid Instruments With/Without Drying



Start Cycle

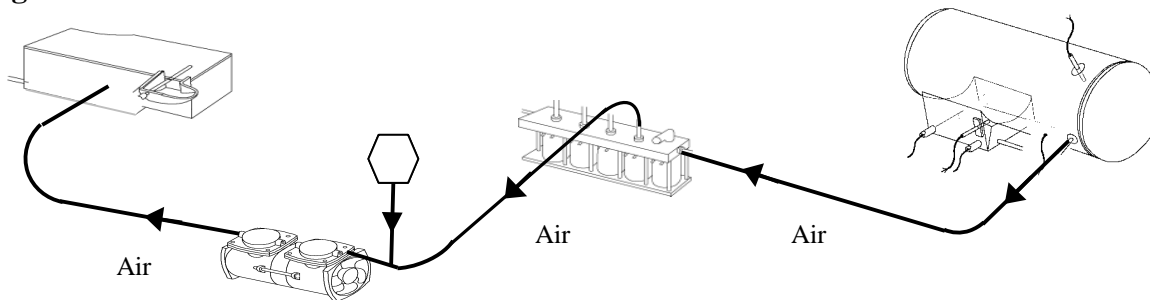




When the unit is switched on, it will go into 'standby mode' where all valves are closed & heater is off. Pressing the ready/standby button puts the unit into the 'ready mode' with the air bleed valve energised & the boiler on a background heat. In the 'ready mode' it is possible to select & start cycles.

If the temperature inside the chamber is above 80°C or the boiler is above 90°C pressing the start button will initiate the cycle but nothing will happen until the temperatures are below these limits.

Stage 1. Pre Vacuum



When the start button is pressed the air bleed valve closes & heater turns off.

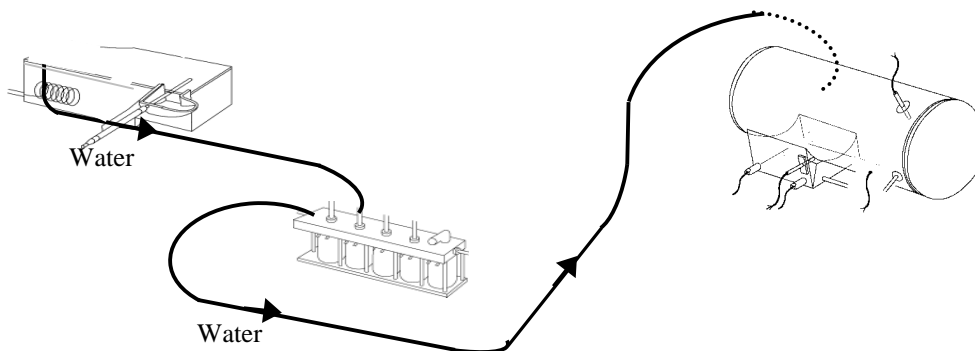
The vacuum pump and vacuum solenoid valve are energised and a vacuum forms within the chamber.

The vacuum is drawn to a set value determined by Cal 11.

On the 134B, 134PR and 134TP cycles the vacuum valve closes and the vacuum pump stops. A leak test is now conducted as follows: - The unit waits for ten seconds then samples the pressure transducer reading. After a set time the pressure is re-sampled and the leak rate determined. If this is less than the set mbar/min then the cycle continues. If it is greater than the set mbar/min, then a User message 15 occurs and the cycle is terminated.

Note Failure to achieve the required vacuum in the time specified in Cal10 will lead to 04

Stage 1. Water Fill



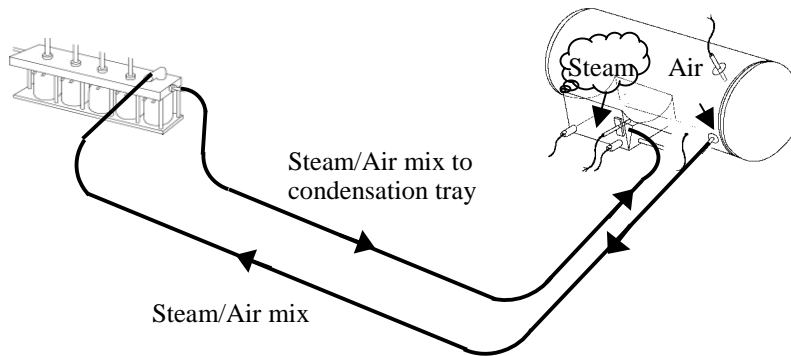
Once the vacuum level has been achieved, the water fill solenoid energises & water travels from the tank, through the water fill valve to the boiler via the filter. There is a hold time where the unit checks for leaks on 134B, 134TP & 134PR cycles before water fill takes place.

The boiler probe also acts as a water level sensor. When the water reaches the boiler probe a circuit is completed and the valve closes.

Note. Two attempts are made to fill the boiler with water. If the sensor does not detect water in a given time frame 13 will be indicated. Following water fill, the procedure varies depending upon which cycle is running. If 134B 134PR or 134TP cycles are running then the heater comes on and the water is heated up to a positive pressure value set in software. At this point the vacuum valve opens and steam is forced through the air bleed. When the pressure is just above ambient pressure the vacuum valve opens, shortly afterwards the pump starts and takes the pressure inside the vessel down to a level set in software. When this level is reached the vacuum valve closes and the vacuum pump stops, the water level in the boiler is checked using the boiler probe water being added when necessary. The procedure above is then repeated (from 1). Then the cycle proceeds to Stage 2.

If 134S or 134U or 121U cycles are running then the cycle proceeds to Stage 2 directly after the first water fill.

Stage 2. Heating



Once the boiler has filled the heater element is powered

The air bleed solenoid is energised (valve open)

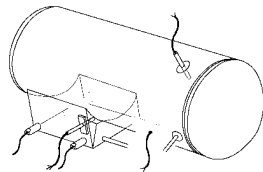
Steam rises into the rear of the chamber and pushes the air forward and out through the hole at the front of the chamber and then to the condensate tray via the air bleed valve or the waste water bottle in single use water variants.

At around boiling temperature, the rate of change in the differential between the boiler and chamber probes begins to be monitored.

When no differential is evident the air bleed valve closes at approximately 106°C and the temperature continues to rise up to the sterilizing temperature.

Note. Failure to achieve zero differential results in 03 being displayed.

Stage 3. Sterilizing



As the temperature approaches the Sterilizing timer start temperature as set in Cal 01, the energy input is reduced avoiding the possibility of temperature overshoot.

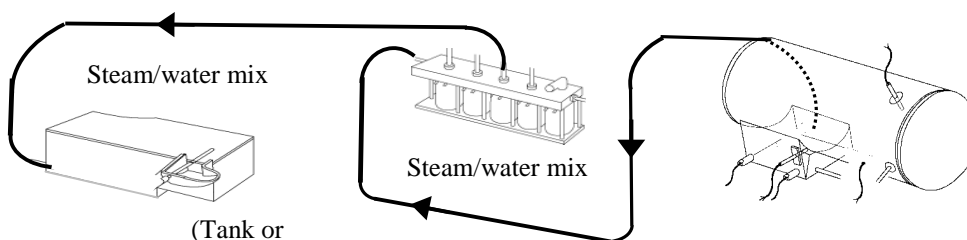
On reaching Cal 01 the sterilizing timer value found in Cal 07 begins.

The temperature continues to rise to the target temperature. This is the temperature at which sterilization will be controlled selected in Cal 02.

During the sterilization period the temperature in the boiler is compared with the temperature in the chamber and these should be in the range of 134, - 0, + 4 degrees for 134 sterilising cycles.

Note: Possible faults displayed in this stage: b02, d02, t02 an explanation of these is provided in Chapter 2.

Stage 4. Depressurisation



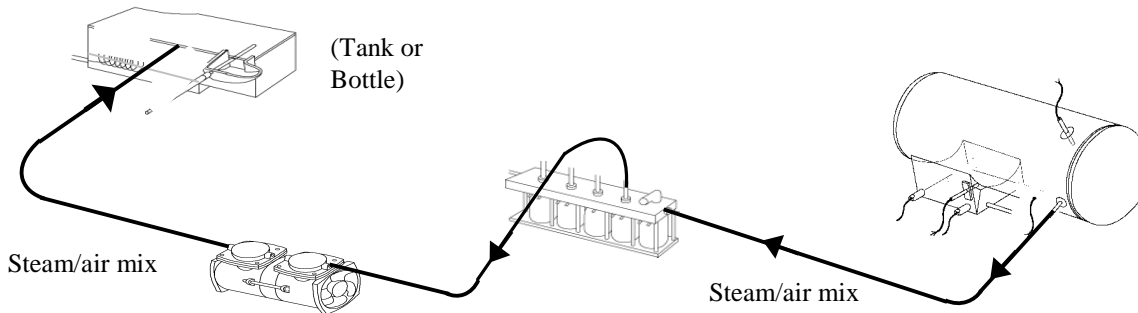
bottle)

At the end of the sterilising period the heater is turned off & the flush valve opens immediately. With the flush valve open the remaining pressure in the chamber forces residual water out of the boiler and back to the water tank or the waste water bottle in single use water variants.

Once all the water has been flushed to the tank / bottle, the pressure in the chamber falls rapidly.

Once the pressure has returned to atmospheric, and dependent on the drying option selected, the cycle either completes or proceeds to vacuum drying.

Stage 4. Vacuum Drying



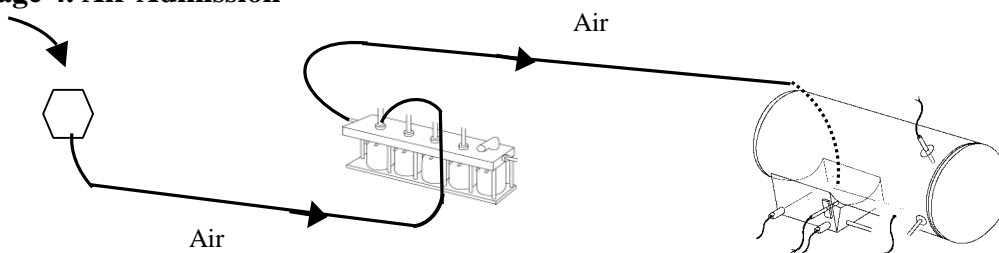
If vacuum drying has been selected, the door remains closed and power is applied alternately to the boiler and heater pad, at the same time the vacuum solenoid is energised opening the vacuum valve and starting the vacuum pump. A vacuum is then pulled for approximately 1 minute (2 minutes for the final vacuum). At the end of the minute the vacuum pump and valve are turned off.

Once the vacuum valve and pump have been turned off, power is applied to the air solenoid, the air valve opens air is allowed to enter the chamber via the air filter, allowing the chamber to return to atmospheric pressure.

Note. If atmospheric pressure is not achieved 11 will be indicated.

Additional drying can be added before a cycle is started or alternatively after a cycle has completed (Refer to the operating instructions).

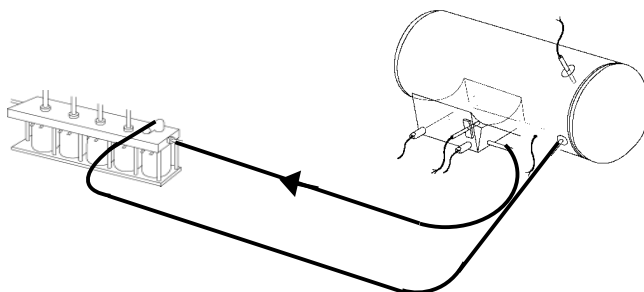
Stage 4. Air Admission



The air valve remains energised for approximately 30 seconds, after which the air valve is de-energised the vacuum solenoid is energised, (valve opens) and the vacuum pump is turned on.

The whole process is then continuously repeated for a period of approximately 28 minutes, at the end of which a final vacuum of 2 minutes duration completes the vacuum drying stage.

Stage 4. Air Equalisation

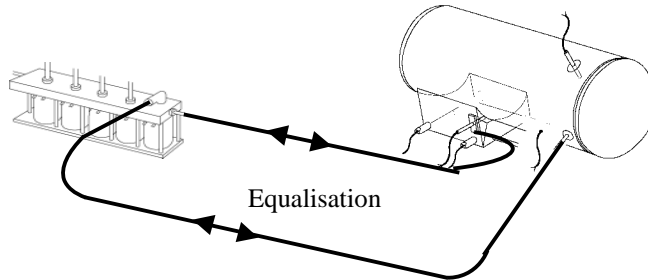


Equalisation



Once atmospheric pressure is achieved, the air valve, boiler and heater pad are de-energised, and power is applied to the air bleed solenoid. The air bleed valve opens and atmospheric pressure is maintained in the chamber.

Stage 5. Cycle Complete



After a few moments delay, the cycle will complete. Indicated by 3 bleeps from the buzzer.

The air bleed valve remains open to avoid a pressure increase or vacuum forming within the chamber, before the door is opened.

Note. A positive or negative pressure in the chamber can stop the door from opening.

Once the door open button is pressed, a reduced power is applied to the boiler heater and this will remain on until the start of the next cycle in order to ensure that the unit is 'warm' ready for the next cycle.

Chapter 2

Fault Modes and Causes

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Fault Diagnosis

Introduction:

Simple mechanical faults are not covered, the operators manual should be consulted for gasket replacement and cleaning etc.

Fault recovery sequences may be found in the operating instructions.

Total Power Loss

In the event that power cannot be restored. If the chamber is at atmospheric pressure, it is possible to open the door by pressing on the end of the door lever, located behind bezel moulding, mimicking the action of the solenoid. Access is via the printer door with right-hand in “thumbs up” format or via the right-hand side bottom of the product. Care should be taken not to disturb the display cable connector.

It should be noted that a significant number of faults are due to a failure to maintain the equipment resulting in leaks, either of steam or water. Always check for leaks first.

Unit flashes ‘Door’ continuously.

The solenoid has been triggered but the door micro switch has not opened.

What to look for:

- Door is held closed due to some mechanical condition
- Door is held closed by a pressure caused during cool down as a consequence of the air bleed valve not operating
- Door micro switch or harness is short circuited (S/C)
- Power control module fault

Unit Flashes Door Intermittently or

Door open Light is not Illuminated When Door Is Shut

Occurs when pressing cycle start button with door “open”

What to look for:

- Door is open/latch is not fully engaged
- Door micro switch/harness fault, open circuit (O/C)
- Check micro switch set position
- Check latch lock parts are functioning correctly
- Power control module fault

01 Power failure at any time during the cycle.

Often an indication that mains power loss to the unit or another fault has occurred.

What to look for:

- Adequate mains supply (minimum 198v for 230v machines).
- Mains fuses.
- Transformer overheated and cut out.
- Excess current being drawn, check solenoid coil resistance and insulation resistance.

02 Error during sterilizing

The autoclave is fitted with an electronic comparator that checks the following conditions during the sterilizing cycle:-

b Ø2 = Temperatures outside of control band

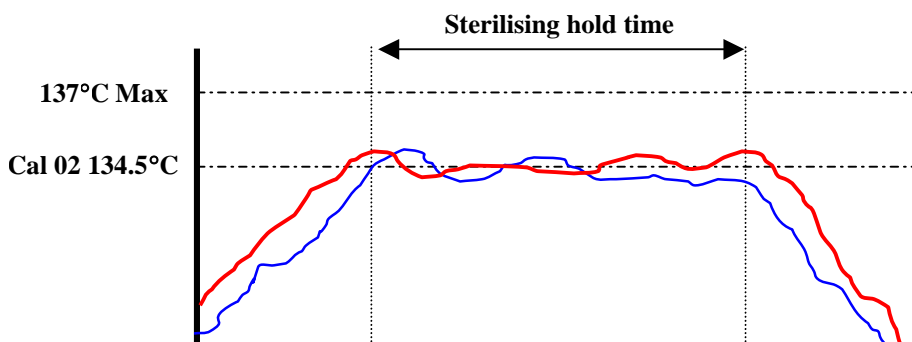
d Ø2 = PT100 boiler and chamber probes do not agree

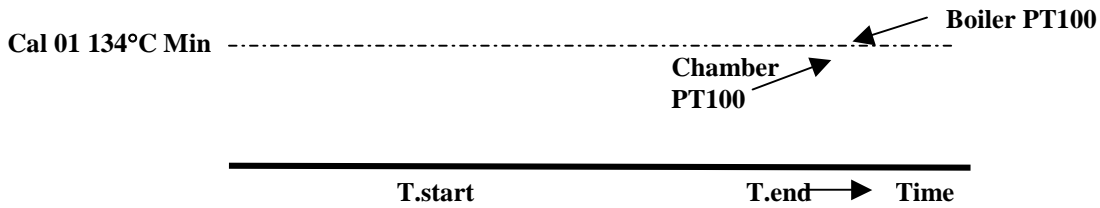
t Ø2 = Sterilizing timing fault

Autoclave has failed to sterilize.

In determining whether or not a cycle has failed, several comparisons are made;

No.1 Sterilizing hold period





When the start temperature is reached (Cal 01), the on board computer sets to zero the cycle timer, it also reads the time clock. When the cycle timer has timed out, the on board computer reads the time clock. The cycle time and timer clock values must agree to better than 10 seconds.

No.2. Compare boiler and chamber PT100 probe values.

During the sterilizing period they must agree, with an error of $<2^{\circ}\text{C}$.

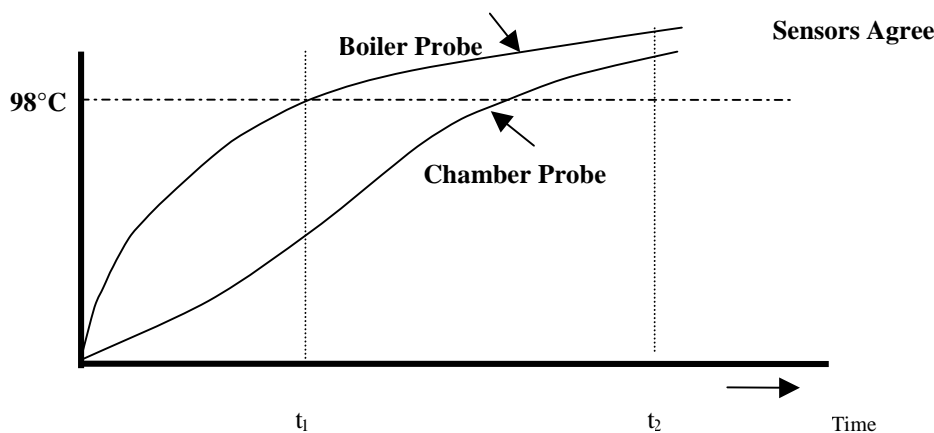
No.3. Both boiler and chamber PT100 must be within the min/max cycle limits.

What to look for:

- Check that the values used in calibration modes CAL01 and CAL02 are as per specification. If CAL02 is more than 3°C higher than CAL01 then a fault will be generated.
- Check chamber probe is correctly inserted.
- Check that both PT100 probes have a similar resistance.
- Check all pipe work for leaks, water loss from boiler giving rise to a boil dry condition during sterilizing will trigger this error code.
- Power control module fault.

03 Air bleed was not successful.

Autoclave has failed to obtain a balance between boiler and chamber PT100 probes within the time limit.



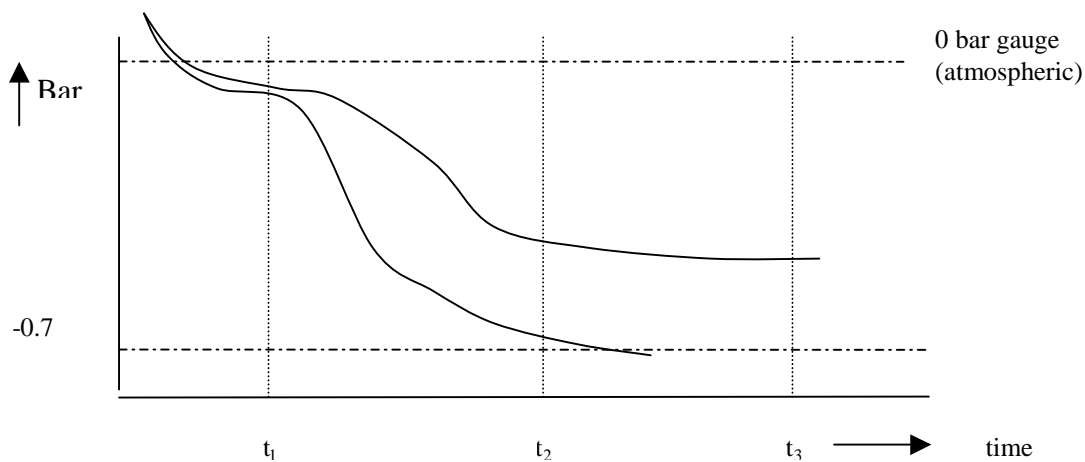
Note: Before a comparison of the probes can take place the chamber temperature must reach 93°C . If the probes have not equalised during the 1200 second time limit, which begins shortly after water fill is detected the user message 03 will be indicated.

What to look for:

- Very low applied voltage (less than 188v for 230v machines)
- Gross steam leak
- Boiler not filling with water
- Air bleed tubes blocked
- Air bleed solenoid valve failed to operate
- Air bleed solenoid blocked
- Check chamber probe is correctly inserted.
- Check that both PT100 probes have a similar resistance at ambient temperature
- Power control module

04 Required vacuum level was not achieved within time allowed

Autoclave detects a vacuum fault.



- t_1 = Vacuum pump on
 t_2 = Vessel vacuum level achieved
 t_3 = Time limit

If vacuum level is not reached inside time limit ($t_3 - t_1 = 10$ minutes) then a fault is reported.

What to look for:

- Water in boiler/vessel
- Vessel/tubing/connection leak (may be quite small)
- Vacuum pump did not operate
- Valve did not open/blocked
- Another valve stuck open
- Pump outlet/inlet blocked
- Pressure sensor not correctly calibrated
- Tubing restricted
- Calibration values incorrectly set

07 Boiler thermistor fault

What to look for:

- Boiler thermistor short circuit to ground
- Power control module

08 Pressure sensor fault

What to look for:

- Pressure sensor open circuit or short circuit
- Power control module fault

10 Water in boiler at end of cycle when door open is enabled

What to look for:

- Was an error code previously displayed
- Fill solenoid fault (open or leaking)
- Check boiler probe
- Ensure flush is successful at end of cycle
- Check boiler filter for blockage
- Power control module

11 Air filter fault

What to look for:

- Air filter blocked

- Tubes collapsed
- Air solenoid fault
- Air bleed tube blocked
- Power control module fault
- Flush solenoid fault

13 Boiler did not fill with water

What to look for:

- Fresh water tank empty due to level sensor fault.
- Fill tubes blocked
- Fill solenoid failed to operate
- Fill solenoid blocked
- Water filter blocked
- Boiler probe (water level sensor function) not connected
- Power control module fault

14 PT100 sensor fault

What to look for:

- Chamber PT100 probe either open circuit or short circuit or short circuit to ground.
- Power control module fault

15 System Leak

To check the system:

- Switch off the unit & plug in a printer unit.
- Switch on the unit.
- Press 'Vacuum Cycles' button until the Time, Date, Cycle count display shows zero. Keeping the button pressed will start the vacuum pump, which will run for approximately 15 minutes.
- On completion of the test the printer will print out the result.

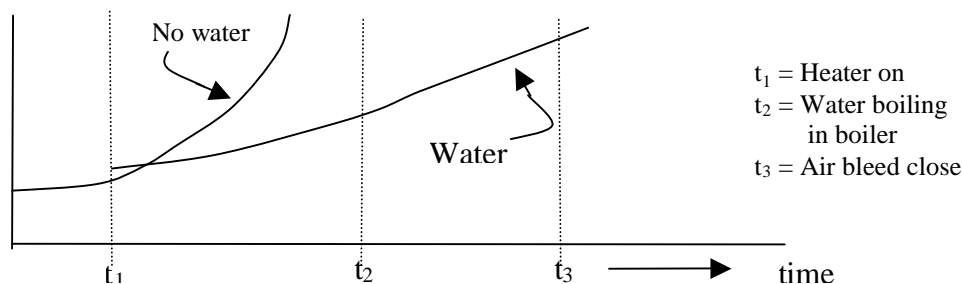
U0d1 Boil dry indication.

Autoclave detects that the boiler has run out of water.

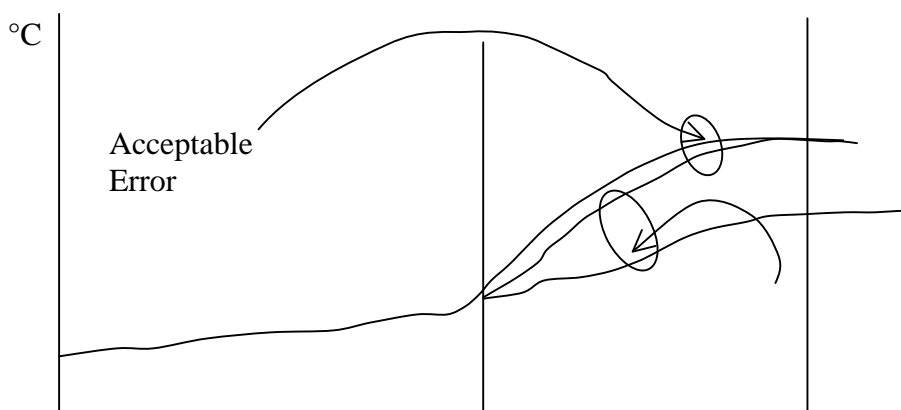
It should be noted that if an U0d1 error occurs before the air bleed valve has closed then the rate of rise of boiler wall temperature can cause the thermal cut-out to operate.

There are two key detection phases:

Phase 1. During the heating phase from end of water fill to air bleed valve close the boiler thermistor is actively checked rapid rise in boiler temperature signifying that there is no water in the boiler.



Phase 2. During the heating phase from air bleed to start of sterilizing the control system is checking to make sure that both boiler and chamber PT100s are tracking. Any significant deviation is reported as an error.



Unacceptable
Error

t_3 = Air bleed close
 t_4 = Sterilizing start

t_3 t_4 \longrightarrow time

Note: During phase 1, most likely causes of water loss are gross steam leak, or large linen load.

During phase 2, most likely causes are:-

- Small steam leak, increasing with pressure
- Linen load
- Chamber probe fault

What to look for:

- Boiler did not fill
- Gross water/steam leak in pipes/pressure release valve etc. Load mass or surface area too great or receptacles open end up retaining water
- Load is too absorbent, eg. Linen materials
- PT100 probe fault boiler or chamber (tracking error, diagnose by substitution.)
- Power control module fault
- Chamber probe insertion depth incorrect.

Note: Thermal cut-out operation is often preceded by an “U0d1.”

U0d2 Time to Sterilizing.

Unit took too long to reach sterilizing temperature.

What to look for:

- Check all pipe work for leaks
- Check that the boiler is heating up.

U0d3 Not pulling a vacuum.

Unit did not see a drop in pressure >50mBar

- Check door setting
- Check gasket

Flashing LED

Insufficient water in fresh water tank to run a cycle.

What to look for if tank is full:

- Check sensor wiring and connectors
- Power control module fault

Door Does Not Open Correctly

This fault may take many forms from not opening, to opening with a loud “popping” noise.

What to look for:

- Failure of hinge lubrication, any increase in stiffness will cause door open spring to be ineffective requiring the door to be pulled open
- Setting of the interlock lever, if incorrectly set it may catch on the lid strike plate preventing the door from opening. Alternatively it may rub on the inside of the door moulding rendering the door open spring ineffective.
- Check that vessel is central to bezel hole. Alignment can be adversely affected when the unit experiences a significant drop when out of the packaging. The only remedy is to rebuild the chassis plate to vessel sub-assembly, paying particular attention to condition of the chassis plates and boiler to vessel bracket.
- Check that the door moulding is correctly fitted.

- Door sealing gasket is sticking to vessel or gasket plate, clean gasket plate and vessel sealing surface.
- Unit being operated at above 1500 metres. (a 42 psi release valve may be fitted for use of up to 2000 meters).
- Vacuum or pressure inside the vessel through valves not operating correctly

Running Temperature is Incorrect

Due to the nature of the control system any hardware failure will render the unit inoperative, calibration drift is very rare.

The chamber and boiler probes are of the platinum resistance type, of proven reliability.

Front end hardware on the power control module that measures the temperature is of a dynamic comparative nature and relies on a balance between the two input circuits, a single failure will therefore show up as a hard fault, usually "14", "03" or "08".

Before making an adjustment using CAL03, CAL04, CAL05, CAL06 check the following: -

- Are the calibration settings for CAL01 and CAL02 correct (CAL08 may be used to reset machine to factory default settings).
- Is the measuring equipment working correctly, is the calibration certificate valid.

Thermal Cut-out Operates

What to look for:

- See U0d1
- Boiler thermistor out of range
- Boiler thermistor not located correctly on boiler
- Power control module fault.

No Display

Loss of Power

What to look for:

- No mains (at plug top).
- Fuses blown.
- Thermal cut-out on boiler.
- Check mains connections on power control module.
- Check transformer output. No output could be caused by a faulty transformer or an overloaded output. (If unit recovers, most likely it is a short circuit on one of the transformer loads.)
- Power control module fault.
- Display module fault/not connected.

Chapter 3

Calibration Modes

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Calibration Modes

Introduction:

Before attempting to make calibration adjustment ensure that:-

- The correct settings for CAL 01 and CAL 02 are used
- The test equipment is calibrated and carries a current certificate.

Failure to observe the above two key points will prevent a satisfactory result from being obtained.

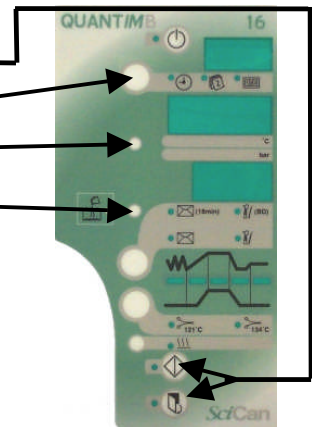
It should be noted that the process controller uses the displayed temperature value to determine the sterilizing start point. It is therefore essential that the steps in sequence as set out below are followed when calibrating the temperature display. CAL 01 and CAL 02 may be adjusted independently if it is sure that the temperature display is accurate.

Entering the Mode

Calibration modes are entered by using an access code complete with up/down and accept buttons, door must be open with unit in ready mode:-

- To enter CAL modes, press and hold door open and cycle start buttons for 10 seconds. The letters “CAL” will appear in the date/time display, “001” will appear in the pressure display window.
- Up button, was date/time/cycle count button.
- Down button, was Deg C button.
- Accept button, was Bar button.

When using CAL modes 01 to 04 inclusive, ignore the small indicator LED's and also ignore 'door' flashing on the display when entering Calibration mode.

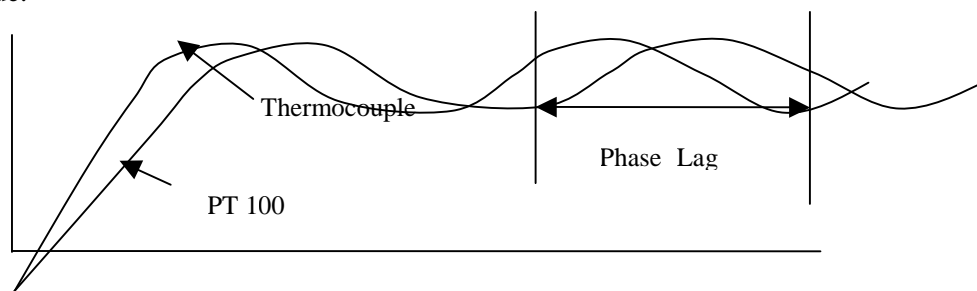


Temperature Display

Sensor (chamber probe) data is used to provide a correct indication of the chamber temperature on the temperature display.

Calibration mode Cal 03 is used to ensure that the displayed value is the same as actual steam temperature.

It should be noted that PT100s do not respond as quickly as thermocouples. Therefore, if an external measuring system is attached using thermocouples, then the external system temperature will always “lead” product displayed value.



Under these conditions of test, a judgement will need to be made as to the required calibration adjustment and when to “accept” as the two systems will never completely agree.

Calibration modes CAL 01 and CAL 02 always operate using the displayed temperature values, this ensures that only one adjustment is required.

Pressure Display

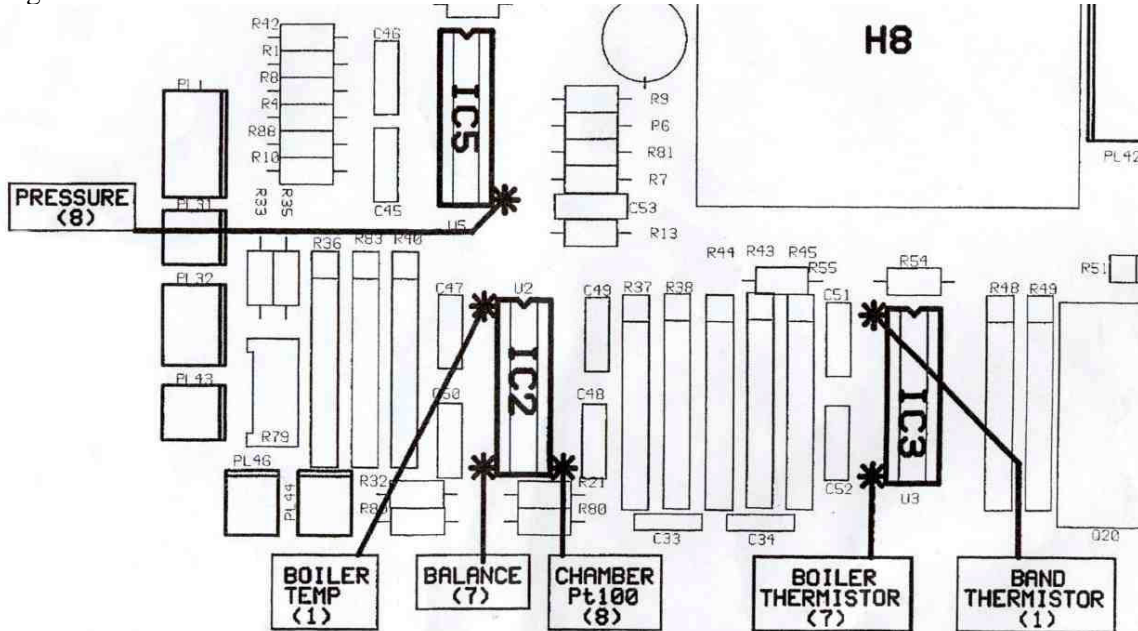
Derived from the pressure transducer + or -.

Balance Voltage Checks

The voltage is checked using a Multimeter and a matched pair of probes.

Clip one lead of the Multimeter on to the bottom left hand leg of integrated circuit (IC2) and the other lead to the chassis earth, the reading observed should be 2.7 vdc at 135 °C.

Rotating the small brass screw on the potentiometer adjacent to the micro switch connector will adjust the voltage.



Integrated Circuit	Circuit Reference
IC 2	U2
IC3	U3
IC5	U5

CAL 01 Sterilizing Start Temperature

This mode is used to set the temperature at which the timed sterilizing cycle starts.

CAL 01 can be set on both 121 and 134 temperature ranges by following the sequence described below:-
SEQUENCE:

- Open door.
- Enter CAL mode.
- Press accept (001 now flashing on the pressure display).
- Use up/down button to adjust to the required temperature value display in °C.
- Press accept to update with the new setting (001 stops flashing and the accepted value is shown on the temperature display).
- Press Standby button to exit CAL 01.

CAL 02 Target Temperature

This mode is used to set cycle target running temperature.

SEQUENCE

- Open door.
- Enter CAL mode.
- Use up/down button to obtain a displayed mode "002."
- Press accept (002 now flashing on the pressure display).
- Use up/down button to adjust to the required temperature value. Display in °C.
- Press accept to update with the new setting (002 stops flashing and the accepted value is shown on the temperature display).
- Press Standby button to exit CAL 02.

CAL 03 Temperature Calibration

This mode is used to calibrate the displayed temperature value (derived from the chamber probe).

Before starting a cycle ensure that the measuring equipment is correctly connected to the vessel using one of the two 1/4 BSP entry ports provided in the door.

Place the thermocouple adjacent to the chamber probe. Other thermocouples may be placed in the centre of the chamber or load if preferred and at the rear of the chamber near the drain (10mm above centre of large hole in rear of chamber floor).

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “003.”
- Press accept (003 flashing on the pressure display.)
- **Select 134°C. Non-Vacuum Non Drying Cycle.**
- Close door and start the cycle.
- Wait 3 minutes after the sterilizing LED comes on for the temperature to stabilise.
- Use up/down button to adjust temperature value displayed in Deg C.
- Press accept to update with the new setting (003 no longer flashing on the pressure display.)
- Press the standby button after a 3 minute wait period then wait for unit to complete the sterilizing cycle.
- After pressing the door release button the display returns to the ready mode.

Follow the same procedure for 121 Deg C calibration, but select 121 Non-Vac Non-Drying cycle

CAL 04 Pressure Calibration

This mode is used to calibrate the displayed pressure value (derived from the pressure transducer).

Before starting a cycle ensure that the measuring equipment is correctly connected to the vessel using one of the two 1/4 BSP entry ports provided in the door.

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “004.”
- Press accept (04 flashing on the Temperature display.)
- **Select a 134°C Non Vacuum Non Drying Cycle.**
- Close door and start the cycle.
- Wait 3 minutes after the sterilizing LED comes on for the Pressure to stabilise.
- Use up/down button to adjust pressure value displayed in bar.
- Press accept to update with the new setting (the temperature display is still flashing 04.)
- Press the standby button after a 3 minute wait period (still flashing 04 on the temperature display.)
- Waiting for unit to complete the sterilizing cycle.
- After pressing the door release button the display, after a very short interval, returns to the ready mode.

Note. Ignore pressure display reading during heating until after air bleed valve has closed.

CAL 05 Pressure Calibration (-ve Pressure)

Pressure Display/Control calibration for negative pressure.

This mode is used to CALIBRATE the displayed negative pressure value.

Before starting a cycle ensure that the measuring equipment is correctly connected to the vessel using one of the two 1/4 BSP entry ports provided in the door.

- SEQUENCE
- Open door
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “005.”Close door.
- Press accept (05 flashing on the Temperature display.)
- Vacuum Pump should start and the pressure display begin to drop.
- Wait for the Pressure to stabilise (very slow change.)
- Use up/down button to adjust pressure value displayed in bar.
- Press accept to update with the new setting (the temperature will still be flashing.)

- The Vacuum pump still running.
- At this point exit CAL 05 mode by pressing the standby button.
- Air bleed opens and unit returns to ready mode.

Note. Ignore the pressure display decimal point. A reading of -2.1 Bar is actually -0.21 Bar. The resolution has been increased in this mode from 0.1 to 0.01 increments.

CAL 06 Pressure Calibration (pressure transducer)

NB: If CAL06 is selected then previous calibration data will be lost, therefore when entered, CAL06 mode must be completed correctly.

For use when either a pressure sensor or power/control module change has occurred.

Pressure Transducer calibration.

This mode is used to calibrate the Pressure Transducer.

Before starting a cycle ensure that an air-line has been correctly connected and that the measuring equipment to the vessel using one or both 1/4 BSP entry ports provided in the door.

SEQUENCE

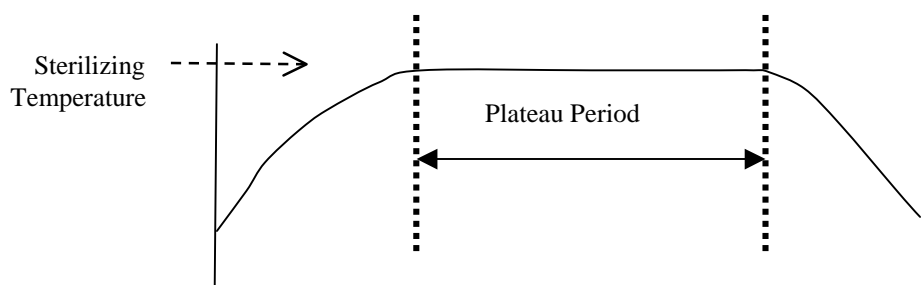
- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “006.”
- Press accept. The Pressure display should be 06 flashing and the temperature display should show 10 or previously set value.
- Vacuum pump will start.
- Close the door.
- When the pressure levels off, at about 130mbar absolute on the calibrated instrument, use the up & down buttons to get the display to show 13, press accept & open the air valve.
- The vacuum pump will switch off and air is allowed into the vessel. Control the air line to 3.5 bar absolute.
- The display will then rise and stabilise.
- Once stable use up & down buttons to obtain, on the unit, the displayed pressure as seen on the calibrated instrument, 3.5bar will show as 350 on the unit.
- Press accept (the display should return to ready mode).
- Switch off at the mains.

Note. Absolute pressure transducer should be used to stop any unnecessary error.

CAL 07 Sterilization Hold Time

This mode is used to set sterilizing cycle timer (plateau period at temperature).

The temperature selection button can be used to select the range to be adjusted whilst in CAL 07 mode.



SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “007.”
- Press accept (007 now flashing on the pressure display).

- Use Up/Down button to adjust to the required time value (displayed in seconds), for the selected temperature.
- Press accept to update with the new time setting (007 stops flashing and the accepted value is shown on the temperature display).
To set the sterilizing timer for any other temperature cycle.
- Select the required cycle. (007 still on pressure display, the new time setting will be shown on the temperature display.)
- Use Up/Down button to adjust to the required time value (displayed in seconds), for the selected temperature.

Note. 007 on pressure display does not flash.

- Press accept to update with the new setting (007 still on the pressure display and the accepted value on the temperature display.)
- Press Standby button to exit CAL 07.

CAL 08 Factory default

This mode is used to return unit to the factory de-fault settings i.e. Temperature and Time.

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “008.”
- Press Accept and the unit should return to ready mode.

Note. If the original default settings are required it is now essential that these are re-booted into the software. This is done by switching off, then back on again at the mains plug.

CAL 09 Residual Air Content

This mode is used to set the residual air content of the vessel.

Do not use this mode unless the means are available to determine residual air content and it is known why the default setting is needed to change.

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “009.”
- Press accept.
- Use Up/Down button to adjust displayed arbitrary value
- Press accept to end sequence.

CAL 10 Pre-vacuum Time limit (seconds) (1st pulse only)

This enables the time limit to be set for achieving the required vacuum pressure. This is a time lag. If the required vacuum pressure has not been reached by the set time error code E 04 will occur.

SEQUENCE

- Open door.
- Enter CAL mode
- Use Up/Down button to obtain a displayed mode “010.”
- Press accept (010 now flashing on the pressure display).
- Use Up/Down button to adjust to the required value. Display in seconds.
- Press accept to update with the new setting (010 stops flashing and the accepted value is shown on the temperature display).
- Exit by pressing the standby button.

CAL 11 Pre-vacuum Pressure limit (1st pulse)

Allows the Vacuum pressure limit to be set.

SEQUENCE

- Open door.
- Enter CAL mode.

- Use Up/Down button to obtain a displayed mode “011.”
- Press accept (011 now flashing on the pressure display.)
- Use Up/Down button to adjust to the required value. Display in kPa.
- Press accept to update with the new setting (011 stops flashing and the accepted value is shown on the temperature display.)
- Exit by pressing the standby button.
- Unit returns to ready mode.

CAL 12 Post vacuum heater temperature

Allows the band heater temperature to be adjusted.

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “012.”
- Press accept (012 now flashing on the pressure display.)
- Use Up/Down button to adjust to the required value. Display in seconds.
- Press accept to update with the new setting (012 stops flashing and the accepted value is shown on the temperature display.)
- Exit by pressing the standby button

Note. Heater band is not activated. Use ENG10 to test Calibration.

CAL 13 Pre-vacuum heater temperature

Allows the band heater temperature to be adjusted.

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “012.”
- Press accept (012 now flashing on the pressure display.)
- Use Up/Down button to adjust to the required value. Display in seconds.
- Press accept to update with the new setting (012 stops flashing and the accepted value is shown on the temperature display.)
- Exit by pressing the standby button

Note. Heater band is not activated. Use ENG10 to test Calibration.

CAL 14 Set Cycle Availability

This facility allows the Engineer to select which cycles can be used. For example only 134°C cycles could be selected. No other 121 cycles could then be used. The sequence of events is as follows:-

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “014.”
- Press accept (014 now flashing on the pressure display.)
- The Temperature display is now showing “On.”
- The LED’s indicate a 134°C TP cycle. The “On” on the temperature display is showing that the 134°C TP cycle has been selected.
 - If this was not required the down button would have to be pressed, which would change the display to “OFF” i.e. not selected.
 - If this is what is required proceed to the next cycle option i.e. 124°C S cycle by pressing the Up button.
 - This is then selected or not selected as required using the same method described above.
 - When set as required press the Up button to go to the next cycle i.e. 134°C PR cycle and proceed in the same manner.
 - Carry on with this procedure until all cycles have been selected or not selected.
 - Once all the settings have been accessed and they have been checked as correct, press accept (014 stops flashing on the pressure display.)

- When the standby button is pressed the unit should now automatically be in CAL 15 (Default setting) i.e. 015 flashing on the pressure display and “On” flashing on the temperature display.
- Scroll through all selected cycles by pressing the Up button.
- When the cycle required is reached press accept, 015 is still showing on the pressure display but has stopped flashing and On is still showing on the temperature display.
- Press the standby button and the unit returns to ready mode.

CAL 15 Set Machine Default

This allows the Engineer to set the required cycle default i.e.

The cycle to which the unit returns to on completion of a cycle etc.

SEQUENCE

- Open door.
- Enter CAL mode.
- Use Up/Down button to obtain a displayed mode “015.”
- Press accept (015 now flashing on the pressure display.)
- Scroll through all selected cycles by pressing the Up button.
- When the cycle required is reached press accept, 015 is still showing on the pressure display but has stopped flashing and On is still showing on the temperature display.
- Press the standby button and the unit returns to ready mode.

CAL 16 }

CAL 17 } Not user Definable

CAL 18 }

Factory Default Settings

	134B	134PR	134TP	134S	121UD	134U
Cal01	134.5*	134.5*	134.5	134.5	121.5	134.5
Cal02	134.5	134.5	134.5	134.5	134.5	134.5
Cal03						
Cal06						
Cal07	240	1080	240	240	930	240
Cal08	Default	Default	Default	Default	Default	Default
Cal09	2	2	2	2	2	2
Cal10	900 secs	900 secs	900 secs	900 secs	930 secs	900 secs
Cal11	34 kPa	34 kPa	34 kPa	34 kPa	34 kPa	34 kPa
Cal12	195	195	195	195	195	195
Cal13	160	160	160	160	160	160
Cal14	On	On	On	On	On	On
Cal15	On					
Cal16	2.75	2.75	2.75	2.75	2.75	2.75
Cal17	50	50	50	50	50	50
Cal18	13	13	13	13	13	13

Note: Whilst the values above are shown when checking the calibration modes the actual software decides when these are applicable.

134B: Standard cycle 134° with fractionated pre vacuum plus drying cycle.

134BP: Prion 18 minute sterilising cycle 134° with drying.

134TP: Test pack cycle & unwrapped instruments 134°. Pre vacuum no drying.

134S: Single pulse pre vacuum no drying.

121U: Non vacuum cycle 121°. Unwrapped solid instruments no drying.

134U: Non vacuum cycle 134°. Unwrapped solid instruments no drying

Chapter 4

Engineering Modes

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Eng 17 }	
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Eng 18 }	
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Eng 19 }	

Engineering Modes

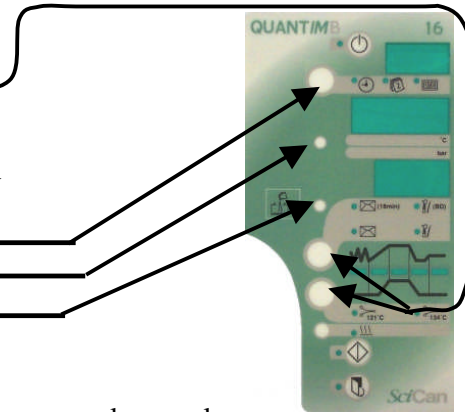
Introduction

Engineering modes are provided to ensure that the diagnostic process can proceed smoothly. Each output device can be operated individually, this allows easy pin pointing of parts that are not operational.

Entering engineering mode

Engineering modes are entered by using an access code complete with Up/Down and accept buttons:-

- To enter ENG modes, press and hold both drying cycle selection button and the button immediately above (this may be concealed) for 10 seconds.
- The letters “Eng” will appear in the temperature display and “001” will appear in the pressure display window.
- Up button, was date/ time/cycle count button.
- Down button, was Deg C button
- Accept button, was Bar button



ENG 01 Pressure Release Valve Test

This mode is used to over pressure the vessel in order to test the pressure release valve. The PRV is not fitted with a pull ring. Do not attempt to manually lift valve.

SEQUENCE

- Open door.
- Enter ENG mode.
- Press accept -(001 Flashing on pressure display & actual vessel temperature on the temperature display).
- Close door.
- Press cycle start button, unit will then proceed as for a normal cycle, eventually the pressure release valve will vent.
- Record pressure / temperature.
- Switch off and on at mains to recover.
- Recovery should then be as per Interruption to a cycle Error Code 01

ENG 02 Printer Test

This mode is used to test that the printer is working

SEQUENCE

- With printer installed
- Enter ENG mode
- Use Up/Down button to obtain a displayed mode “002”
- Press accept – this will produce a test print.
- Press accept again to make test
- Press standby button to exit – unit returns to ready mode.

Printer should then print out (typically):

Serial No: 03010800 (For example)

Date: 08/01/03 (For example)

Time: 10:52 (For example)

Version: QB_1_0_3 Type B (For example)

Printer Test: OK.

ENG 03 Valve Test

This mode is used to test that the valve block is working.

The air bleed valve may be tested in this mode (also “standby” followed by Ready - only after power On/Off.)

Open door, use a tube and blow air through hole in brass fitting in the chamber whilst cycling valve On/Off.

Both fill and flush valves can be checked for flow rate. Remove tube from boiler filter, place a container under tube. Fill water tank. Cycle valves On/Off and check flow rate.

Fill circuit has a higher flow rate than flush valve.

SEQUENCE

- Enter ENG mode
- Use Up/Down button to obtain a displayed mode “003”
- Press accept - 003 Flashing on the pressure display and the first cycle status LED is illuminated.
- Press the accept button - 003 Still flashing but first cycle status LED goes out.
- Press accept - 003 Flashing on the pressure display and the second cycle status LED is illuminated.
- Press the accept button - 003 Still flashing but second cycle status LED goes out.
- Repeat the above procedure until all valves have been tested. Each cycle status LED represents a valve and when illuminated indicates that the valve is open.
- Once each valve has been tested it is possible to exit by pressing the standby button.

The following is a key for identification purposes: -

Key for identifying valves

- 1st. Cycle Status LED “On” = Air Bleed Valve Open.
- 2nd. Cycle Status LED “On” = Vacuum Valve Open.
- 3rd. Cycle Status LED “On” = Flush Valve Open.
- 4th. Cycle Status LED “On” = Water Fill Valve Open.
- 5th. Cycle Status LED “On” = Air Inlet Valve Open.
- During this mode it is possible to check valve function by disconnecting pipes and checking for flow, it is possible to check the air bleed function by blowing into the air bleed fitting using a piece of tube (fitting located bottom front left of chamber with door open.)
- It is possible to use a Multimeter to check the applied voltage at the power control module connector block, also check coil resistance (when valve harness is disconnected from module).

Note. If there is any water in the water tank then the boiler will tend to fill when either the water fill or flush valve are opened this may lead to an Error code 10.

ENG 04 Vacuum Pump Test

This mode is used to determine if the vacuum pump is working.

Note: Vacuum pump will not start if a vacuum exists in the inlet pipe.

SEQUENCE

- Enter ENG mode
- Use Up/Down button to obtain a displayed mode “004”
- Press Accept button - 004 Flashing on the pressure display and Eng on the temperature display. The vacuum pump also starts running.
- Press Accept button again - 004 Flashing on the pressure display and Eng on the temperature display. The vacuum pump is no longer running.
- The pump can be switched on and off by pressing the accept button.
- When finished Exit by pressing the standby button - unit returns to ready mode.

ENG 05 Fan Test

This mode is for testing the fan.

SEQUENCE

- Enter ENG mode
- Use Up/Down button to obtain a displayed mode “005”
- Press Accept button - 005 Flashing on the pressure display and Eng on the temperature display. The fan is now running at varying speeds.
- When finished Exit by pressing the standby button - unit returns to ready mode.

ENG 06 Door Solenoid Test

This mode is used to test that the door solenoid is working.

Shut door, operate mode, check that door pops open but held in drying position, release mode and check door opens fully.

SEQUENCE

- Enter ENG mode
- Use Up/Down button to obtain a displayed mode “006”

- Press accept - 06 Flashing on Pressure Display, with Eng on the temperature display. The solenoid also energises, and the door opens to the drying position.
- Press accept again - 006 Flashing on Pressure Display, with Eng on the temperature display. The solenoid is now de-energised.
- Press standby button to exit - unit returns to ready mode. It is possible to use a Multimeter to check the applied voltage at the power control module connector block, also check coil resistance (with solenoid disconnected from the module).

ENG 07 Boiler Heater Element Test

This mode is used to test that the Triac drive circuit and the boiler heating element are working.

If left 'on' in this mode it is possible to test thermal cut-out located on the boiler.

It may show E12 error before cut-out operates.

SEQUENCE

- Enter ENG mode
- Use Up/Down button to obtain a displayed mode "007"
- Press accept - 007 Flashing on the pressure display. "OFF" on the temperature display. This indicates Triac drive inactive.
- Press accept - 007 Flashing on the pressure display. "On" on the temperature display. This indicates Triac drive is active.
- Press standby button to exit – unit returns to ready mode

Note. When using this mode, place 100ml of water in boiler and wait for steam to be generated, then de-energise to check that correct function is obtained.

It is possible to use a Multimeter to check the applied voltage to the heating element, also check element resistance with mains power off and element disconnected from module.

ENG 08 LED & Buzzer Test

This mode is used to test that all the display LED's and buzzers are working.

SEQUENCE

- Enter ENG mode
- Use Up/Down button to obtain a displayed mode "008"
- Press accept - All LED's begin to flash on and off accompanied by a buzzer.
- Press standby button to exit - unit returns to ready mode.

ENG 09 Leak Test

This mode is used to check for any leaks under vacuum.

NB: Actual vessel leak rate can be tested.

Attach a pressure transducer and external display to vessel via door access entry ports.

Run ENG09. When the mode is complete do not return to "ready" as vessel is now sealed the actual leak rate can be calculated.

When vacuum pump stops wait 5 minutes then read vacuum level (V_1) wait 10 minutes, read vacuum level (V_2)

$$\text{Leak rate} = \frac{V_1 - V_2}{10} = \text{m bar/min}$$

(Assumes vacuum levels are measured in m bar.)

SEQUENCE

- Enter ENG mode
- Use Up/Down button to obtain a displayed mode "009"
- Press accept - 009 Flashing on the pressure display. Eng on the temperature display. 1st. Cycle status LED on. After 15 seconds if the pressure has dropped by 15 kPa then the second cycle status LED will come on and the vacuum will continue. Once the second status LED is illuminated there is a time limit by which a certain negative pressure has to be achieved. This is set by Cal Modes 10 & 11. If the negative pressure value is reached in the set time "PASS" is displayed in the temperature display. If the pressure is not reached due to leaks then "FAIL" will be displayed in the temperature display.
- Press standby button to exit & the unit returns to ready mode.

ENG 10 Drying Cycle Heater Test

To check that the drying cycle heater warms up.

SEQUENCE

- Enter Eng mode
- Use Up/Down button to obtain a displayed mode "010"
- Press accept - 010 Flashing on the pressure display. "OFF" on the temperature display. This indicates that the band heater is switched off.
- Press accept - 010 Flashing on the pressure display. "On" on the temperature display. This indicates that the band heater is switched on.
- Check using thermocouple attached to vessel base.
- Exit by pressing standby - unit returns to ready mode.

ENG 11 }**ENG 12 }****ENG 13 }****ENG 14 }****Not User Definable****ENG 15 }****ENG 16 }****ENG 17 }****ENG 18 }****ENG 19 }**

Chapter 5

Maintenance

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Maintenance

Suggested quarterly maintenance

Drain and clean all external and internal surfaces, remove and clean filters.

Check/replace door seals, 'O' rings & door grommets.

Clean sensor probes

Check door closed interlock

Check the function of the valves, fan, door solenoid, LED's & buzzer

Prove overheat cut out and safety valves using test Eng.

Run cycle check temperature with test equipment, check displayed temperature and pressure

Check all safety interlocks and general condition of unit

Suggested annual maintenance

All the above quarterly checks, plus:

Carry out electrical insulation and earth continuity test

Change door seal

Tools and Test Equipment

Special Tools

Part No	Description	Quantity
279400	Spacers for vessel to chassis alignment.	1
279401	Spacer rear chassis plate.	1
279402	Remover hinge pin.	1

Standard Hand Tools

Socket 26mm
 Socket 13mm extended
 Socket 19mm
 Extension 3/8 x 125mm
 Spinner, nut M5
 Spinner, nut M4
 Screwdriver Pozi 1
 Screwdriver Pozi 2
 Screwdriver Pozi 4
 Spanner, 10mm A/F
 Spanner, combination 13mm A/F
 Pliers, circlip
 Screwdriver, 6mm flat blade
 Screwdriver, 3mm flat blade
 Pliers
 Side cutters, small
 Allen Key, 4mmA/F
 Gauge, feeler 0,5mm
 Adaptor, entry port-1/4 BSP, (quantity 2)
 Spanner 30mm

Electrical Equipment

Multimeter, 3.5 digit
 Megger or equivalent 500vdc

Temperature Measuring Equipment

Thermocouple, single point, type T or K.

Accuracy +/- 0.2 deg at 134 deg C (calibrated).

Resolution 0.01 bar

Pressure Measuring Equipment

Range absolute. Accuracy +/- 0.02 bar at 3 bar absolute (calibrated).

Resolution 0.01 bar

Consumables

Part No	Description	Quantity
279142	Glass tape	4 x 40mm rolls
279218	RTV	1 tube
279118	Tie wrap	10
	Vaseline	1 tub
279217	Grease	1 tub
	Dry PTFE Spray Lubricant	1 can
	Tape PTFE	1 roll

Torque Settings

Nut M30 chamber housing	1.5 Nm
Nut M8, boiler strap	10 Nm
Nut dome, door plate	10 Nm
Nut M8, vessel to chassis plate	24 Nm
Bolt M8, chassis plate to bezel	20 Nm
Fixing M6	6 Nm
Fixing M5	2.5 Nm
Port door entry	2 Nm
Screw strike plate	0.5 Nm
Plate door micro switch	1.7 Nm
Boiler probe fixing nuts	1.0 Nm
Thermal trip switch	0.7 Nm

Electrical Values

	Typical Values
Solenoid, valve Coil	13.7Ω
Solenoid, door	12.8Ω
Heater, boiler 230v	24.7Ω
Heater, boiler 110v	8.0Ω
Sensor, PT100, chamber and boiler (at ambient)	109.1Ω
Thermistor, boiler sensor (at ambient)	80.5Ω
Coil, vacuum pump	39.0Ω
Solenoid, drive voltages, door and valve block	5.1v
Fan, drive (using Eng 05)	23.0v
Transformer, output (orange)	36.0v
	(white) 10.4v
	(Yellow) 12.6v
Printer, drive	12-18vdc

Parts Removal and Re-fitting

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Before working on the product ensure that it is unplugged from the mains supply and that the fresh water tank is empty.

1. Gasket replacement

The gasket is located on the inside of the door and is accessed by:

Opening the door.

Removing the two M6 dome nuts securing the gasket plate.

Taking a firm hold of the sealing gasket lip and pull hard to remove the gasket and plate from the vessel lid.

Peel the gasket from the plate.

On reassembly ensure that plate is clean, seat gasket onto plate such that gasket lip is on the same side of the plate as the entry port plug heads (**Not Nut Side.**) Always use new seals under dome nuts. Tighten to 10Nm.

Note. (a) Any dirt on the sealing rib of the gasket or on the vessel sealing surface will cause a steam leak.

(b) Spray cast lid in gasket seat area with dry PTFE lubricant to prevent gasket from bonding to cast lid.

Spares refer to chapter 6 figure 1

2. Front door moulding removal

Open the door.

Unclip the flexible pipe from the door moulding.

Remove 4 off M6 x 16mm securing screws.

On reassembly, check that rubber bushings and metal spacers are in place and in good order.

2.1 Use of entry ports

Remove front door moulding.

Remove either one or two entry port plugs as required.

Note. It is now possible to insert the required test equipment.

On reassembly, ensure that the plug heads are inside the vessel and the nuts are visible when door is shut. Torque tighten.

Spares refer to chapter 6 figure 1

3. Printer door moulding and Hinge replacement

Using slight force, simply pull hinges out of bezel moulding

On reassembly, “Superglue” hinges into door moulding. Hinges are a push fit into bezel, do not glue.

Spares refer to chapter 6 figure 1

4. Electrical cord and Fuse replacement

Remove 4 off fixing screws holding the cable clamping plate from the rear moulding.

Disconnect the electrical cord from the power/control module.

The two fuses can now be accessed through the gap left by the removal of the clamping plate.

Spares refer to chapter 6 figure 1

5. Rear case removal

Place a 30mm spacer under the chassis to support the unit during removal.

Remove 4 off M4 screws and disconnect the mains cable from the power board.

Remove the rear access panel and disconnect fan connector from the power/control module.

Remove 3 off M4 fixing screws from rear case.

Remove the coil from the end of the water outlet pipe.

On reassembly, reverse above actions but ensure that rear case does not pick up on any wires and replace the water outlet pipe ensuring the earth wire is attached to the rear case.

Spares refer to chapter 6 figure 1

Note: Once the rear case has been removed the following items can be accessed

6. Fan and Finger guard removal

Located on the side of the rear moulding the fan and guard is removed by:

Removing 4 securing screws from side of the rear moulding.

Fan and finger guard may now be removed.

On reassembly, ensure that the airflow direction is out from the rear moulding and that the wires exit from fan at its bottom front corner.

Spares refer to chapter 6 figure 2

7. Water tank removal

Located on the side of the chassis, unplug the electrical wires (blue and yellow) from the power/control module.

Remove silicone tube from bottom of tank (collect residual water).

Remove the tie wrap from the locating pip on rear of tank.

Slide tank rearward off the chassis and carefully remove.

Spares refer to chapter 6 figure 3

8. Vacuum pump removal

Located on the side of the chassis, disconnect the hoses from pump to the valve block and manifold block.

Remove the valve block (para 20).

Unplug from PCB and ease the harness through the chassis.

Undo the 4 off nuts securing the pump to the vessel side of the chassis.

8.1 Pump bracket removal

The brackets are secured to the chassis by 4 M6 nuts.

On reassembly ensure that the tubes are not going to chaff against the bracket and the tubes are pushed fully over the spigots. It is advisable to change all tubes.

Spares refer to chapter 6 figure 3

9. Air filter replacement

Located on the chassis above the vacuum pump, unclip filter.

Remove adapter from filter

On reassembly, change adapter and clips as required.

Spares refer to chapter 6 figure 3

10. Pressure transducer and harness removal

Located on the chassis plate, unplug transducer harness from the PCB

Cut tie wraps holding the transducer & tubes.

Disconnect pressure transducer and tubes being careful not to kink the hoses

On reassembly, ensure that the tube to sensor fit is good, leaks here will prevent cycle operation.

Ensure that sensor body is not crushed against the chassis plate, the tube is not kinked and is not likely to chaff against the vacuum pump bracket.

Run calibration mode 06 then leak test Eng 09.

Spares refer to chapter 6 figure 3.

Note. Spare transducers are not recommended unless equipment is available to calibrate the transducer to the power control module.

11. Display module removal

Located at the back of the bezel moulding remove the fresh water tank (para 7).

Unplug the display module supply and the printer cables.

Remove 6 off M3 x 5mm fixing screws.

Remove the display PCB module.

On reassembly, ensure that all the small 3mm LED's line up with the holes in the bezel and that the switches are flush with the outside face of the moulding.

Spares refer to chapter 6 figure 3

12. Door solenoid removal

Located on the chassis under the bezel moulding, remove the water tank (para 7).

Remove four securing screws and springs.

Unplug the solenoid (two red wires) from the power/control module.

On reassembly, ensure that the springs are fitted correctly.

See chapter 6 figure 3 for spring arrangement

Spares refer to chapter 6 figure 3

13. Chamber temperature probe removal

Located on the topside of the vessel, undo the large black nut from the brown sensor housing until the keeper piece is loose.

Pull out the PT100 sensor.

Remove sensor wires from the terminal block on power/control module.

On reassembly, it is recommended to change the small black sealing grommet within the brown sensor housing. The PT100 probe tip should be flush with the inside rim of the brown moulding, open door to check. Ensure that the large washer is in place and hand tighten only the nut.

Spares refer to chapter 6 figure 3

14. Chamber sensor moulding removal

Located on the topside of the vessel, remove the probe (para 13).

Remove first the black nut, washer and the keeper piece.

Remove second black nut.

Moulding may now be removed by pushing into the chamber.

On reassembly, it is recommended to change both moulding to vessel seal and sensor grommet. Always ensure that the moulding to vessel seal is correctly seated before applying black nut, this may be done by viewing seal from the outside of the chamber. When viewing seal from the inside front of the chamber, the small black tab should be clearly visible at the point nearest the front of the chamber. Black nut holding moulding to vessel should be hand tightened plus ½ turn with a spanner.

Spares refer to chapter 6 figure 3

15. Power Control module removal

Located at the rear of the unit at the back of the vessel, unplug all connectors, noting position of connectors (ref to circuit diagram).

Remove 4 off M5 x 10mm fixing screws.

Slide the entire bracket out of the chassis plate cut out.

Unplug flying leads to the boiler heating element.

On reassembly, ensure that all electrical wires are cable tied and clear of the boiler.

Spares refer to chapter 6 figure 3

16. Transformer removal

Located on side of the chassis on the hinge side of the unit, unplug the transformer from the power/control module.

Remove 1 off M5 x 10mm fixing screw and 1 off M5 fixing nut.

Swing transformer free of the top bracket location.

Remove transformer.

Spares refer to chapter 6 figure 4

17. Door micro switch replacement

Located between the front door moulding and attached to the vessel lid, remove door moulding (para 2).

Cut tie wrap holding micro switch wire to chassis plate.

Unplug door micro switch from power/control module.

Feed door micro switch wire through hinge area to outside of bezel moulding.

Remove 2 off taptite screws securing the hinge cover plate.

Remove glass fibre tape.

Remove 2 off M4 x 5mm fixing screws.

On reassembly, ensure that the washers are in place, set micro switch such that with the door shut and the lever fully engaged on the strike plate the micro switch contacts have changed state to close the circuit (micro switch body should be almost touching the lever angled face.)

Spares refer to chapter 6 figure 1

18. Door open spring removal

Located behind the hinge.

Unclip spring.

On reassembly, ensure that the sleeve is refitted over the spring body.

Spares refer to chapter 6 figure 3

19. Vessel lid removal

Located in the door, remove door moulding (para 2).

Cut tie wraps holding door micro switch to chassis plate and bezel.

Remove the door micro switch (para 17).

Remove the door spring and the anchor post (para 18).

Remove hinge pin top circlip.

Place unit on its side (tank side to worktop).

Align lower hinge pin circlip "ears" with free space so as to avoid chassis plate.

Insert the pin extractor tool through the aperture in the base of the bezel and screw into the hinge pin.

With the right hand supporting the vessel lid in the closed position draw out the pin.

Place the pin and tool on a clean surface.

Release the door catch and remove the vessel lid.

Note. Failure to fit circlips **WILL** result in vessel failure.

Always apply ample grease to pin and outer mating surfaces of the vessel extrusions.

The pressure vessel and lid are treated as a single spares item due to the safety implications of in field repairs being made without a full hydrostatic test being available.

Always apply grease to pin and outer mating surfaces of the vessel extrusions.

The vacuum vessel lid differs in that the hinge holes are slotted, a lid from a non-vacuum machine will **NOT WORK**.

Spares refer to chapter 6 figure 4

20. Valve block removal

Located in between the vessel and the chassis, rotate product and place face down on a protected work surface.

Unplug valve block from power control module.

Free up harness back to valve block.

Disconnect the tubes from the dump manifold attached to the chassis plate

Disconnect air bleed tube.

Disconnect the transducer tube.

Disconnect vacuum pump hose.

Disconnect air filter.

Disconnect tube from water tank

Disconnect boiler tube at boiler end.

Disconnect the tap & pull silicone tube back through bezel hole.

Remove 2 off M6 x 8mm fixing nuts.

On reassembly, always fit a new tube between valve block and water tank.

Ensure that all electrical wires are cable tied and clear of the boiler.

Spares refer to chapter 6 figure 4

21. Boiler /Vessel seal replacement

Located under the unit attached to the vessel by a strap, remove power/control module.

Remove 4 attaching screws to release the rear support bracket by removing Invert unit.

Remove 2 screws, block and pillar nuts to release the thermal cut out on rear of boiler.

Remove earth wire from boiler.

Undo the 2 off M8 fixing nuts.

Pull boiler off vessel breaking the boiler to vessel seal.

On reassembly, ensure that the correct size of boiler is used and always use a new boiler to vessel seal..

Set boiler at the correct dimension from the front lip of the vessel.

Ensure that the boiler is installed flat with respect to the chassis plates.

Note: All electrical wires are cable tied and must be clear of the boiler.

Spares refer to chapter 6 figure 4

22. Boiler temperature and Water level sensor removal

Attached to the side of the boiler, remove 2 off M3 long nuts on side of boiler.

Pull out probe.

Pull out seal.

Remove clamp plate.

On reassembly, always fit a new seal. Insert probe until only 15mm remains outside of the boiler from cast face of boiler.

Note. The outer sheath of the probe is the water level sensor.

Spares refer to chapter 6 figure 4

23. Boiler thermistor removal

Attached to the side of the boiler, cut cable tie securing the yellow twisted wires.

Pull sensor out of boiler casting.

On reassembly, ensure that all the old RTV is removed from the boiler hole.

Before inserting new probe ensure that the boiler hole is well packed with RTV (use fast cure RTV, leave until set before running autoclave.)

Spares refer to chapter 6 figure 4

24. Pressure relief valve removal

Located at the top of the vessel, behind the vessel probe

Using a 20mm socket on the inside of vessel nut and a 17 mm open jaw spanner on outside vessel adapter remove the valve.

On reassembly, always use a new valve to vessel seal

Spares refer to chapter 6 figure 3

25. Water filter removal

Fitted to the side of the boiler, undo plastic pipe back nut.

Remove plastic pipe.

Remove filter.

On reassembly, flush out boiler with water

Use PTFE tape on filter thread & do not over tighten.

Spares refer to chapter 6 figure 4

26. Drying cycle heater element removal

Attached to the underside of the vessel secured by three straps, rotate unit and place top down on work surface.

Remove heater element wire for terminal block on the power/control module.

Undo straps holding band in place.

Remove band.

Spares refer to chapter 6 figure 4

27. Harness thermal cut out removal

Disconnect the terminals on the power module.

Remove 2 screws, block and pillar nuts to release the thermal cut out on rear of boiler.

Spares refer to chapter 6 figure 3

28. Vessel Removal

Disconnect the door spring.

Remove the chamber temperature probe and chamber sensor moulding.

Undo the drying cycle heating element. (para 28)

Remove the 4 screws holding the rear chassis panel.

Disconnect the boiler. (para 22)

Remove the vacuum pipe at the base of the vessel.

Remove the 4 nuts attaching the vessel to the chassis.

Lift the vessel from the chassis.

Note. The pressure vessel and lid are treated as a single spares item due to the safety implications of in field repairs being made without a full hydrostatic test being available.

Always apply grease to pin and outer mating surfaces of the vessel extrusions.

The vacuum vessel lid differs in that the hinge holes are slotted, a lid from a non-vacuum machine will **NOT WORK**.

Spares refer to chapter 6 figure 4

29. Bezel moulding removal

Located between the door and the chassis

Empty the water tank.

Remove furniture.

Remove rear moulding (para 5).

Remove door moulding.

Cut ties securing door micro switch harness, unplug micro switch.

Remove circlip from top of door hinge pin.
Remove hinge pin and ease the door out.
Push water drainpipe through hole in bezel.
Place unit face down.
Unplug the display harness from the display module.
Release the water drainpipe, the display, valve, and door solenoid harness from the clips on the bezel.
Remove the three nuts, one bolt and four washers that secure the chassis to the bezel. Lift the chassis and vessel assembly clear of the bezel.
Set the chassis down in an upright position on a firm surface (when lifting the chassis hold the door interlock in the open position).

On reassembly, place the new bezel on a protected surface (preferably packed up on the low side so as to be level).

Fit the display board into the bezel.

Lift the chassis assembly face down and lower onto the three locating studs in the bezel, ensuring that no harness or tubing is in a position to get caught between chassis and bezel.

Place one washer and nut on each of the three studs. Tighten a little more than hand tight so as to hold the chassis in place for the next operation.

Turn the unit onto its side and replace the door, when the hinge pin is in the correct position, refit circlip.

Replace the chassis to bezel washer and bolt.

Turn the unit upright and check the door alignment (if not correct then loosen the nuts slightly).

Set the unit in a position that the widest gap around the door is on the bench tighten any nuts or bolt that is accessible.

Turn unit upright. Check door alignment when correct tighten the three nuts and one bolt to 8nm.)

Refit all other parts.

Note A new front decal will need to be fitted.

Spares refer to chapter 6 figure1

30. Chassis Plates removal

Remove door moulding (para 2).

Remove power/control module (para 15).

Remove transformer (para 16).

Remove the vacuum pump and carrier (para 8).

Remove the air filter (para 9).

Rotate vessel and place face down on a protected work surface.

Remove valve block (para 20).

Remove the transducer. (para 10)

Remove fresh water tank (para 7).

Remove vessel lid (para 19).

Undo and remove 3 off M8 nuts and 1 off M8 bolt.

Free wire from bezel clips (do not disturb the display harness).

Free silicone tube from bezel.

Lift chassis assembly out of moulding and place on a work surface correct way up.

Remove 2 off M4 x 10mm solenoid fixing screws.

Remove solenoid (para 12).

Remove solenoid armature from interlock lever.

Remove interlock pin top circlip.

Slide pin out.

Remove interlock lever.

Place assembly face down on a protected work surface.

Remove 4 off M8 vessel to chassis plate fixing nuts.

Slide out chassis plate on hinge side of vessel.

Slide out chassis plate on interlock side of vessel, at same time remove solenoid bracket.

Chassis Plates reassembly

Place solenoid bracket on hinge side bolts before spacer.

2 off spacers (flat rectangular sheet with two holes for stainless steel vessel;

2 off small M8 washers to be fitted under the M8 nuts hinge side (washer fits between nut and chassis plate)

2 off large washer to be fitted under the M8 nuts interlock side (washer fits between nut and chassis plate)

4 off large washer to be fitted under 3 off M8 bolts and 1 off M8 nut fixings chassis plates to bezel moulding

Tighten 4 off vessel to chassis plate M8 nuts to 24 Nm

Tighten 3 off bolts M8 and 1 off nut M8 to 8 Nm.

Note. Failure to fit circlips **WILL** result in vessel failure.

1. Setting the pressure vessel into the chassis plates

Reassemble vessel and chassis plates to the point where final tightening of the vessel to chassis plate fixing nuts is required (before fitting interlock lever and solenoid.)

Place assembly face down on a protected work surface

Fit spacer blocks to the 4 off chassis plate front holes, this will leave the vessel sealing face flat on the surface whilst lifting up the chassis plates, when all is settled without gaps, tighten vessel to chassis plate fixing nuts.

Place assembly in bezel and check that the vessel is central to the bezel, if not, repeat previous step but making an adjustment to ensure centralisation. Failure to centralise vessel to bezel will cause cast lid to bezel alignment problems and possible damage to the bezel paint finish.

2. Setting of the solenoid.

Reassemble chassis plates and vessel such that the solenoid and interlock lever are reinstalled (solenoid 2 off M4 fixing screws in place but not tightened.)

Fit lid to vessel

Adjust M4 stop screw on solenoid bracket such that with lever fully engaged on cast lid strike plate a gap of 0,5mm exists between lever and end of stop screw.

Tighten locking nut and check clearance.

Vessel door should, on closing, first touch the interlock lever on its angled face.

By hand squeeze interlock lever and solenoid so as to mimic the solenoid when energised (solenoid **MUST** be bottomed.)

Slide solenoid back until the outer edge of the interlock lever is fully engaged on the metal plate closing the recess in the casting in which the lever operates.

Tighten solenoid fixing screws.

Check operation of door by pushing vessel lid into the closed position, then manually operate the solenoid to its full extent and check that the door opens freely and is caught on the outer face of the interlock lever.

Note. M4 stop screw not required for vessels with single piece flange.

3. Safety. Failure to correctly fix and locate pressure vessel will cause problems with cast lid and door alignment.

Failure to correctly set the solenoid may invalidate essential safety features

4. Always apply grease to pin and outer mating surfaces of the vessel extrusions.

Spares refer to chapter 6 figure 3

IF IN DOUBT CALL SciCan FOR ASSISTANCE.

Chapter 6

Spares Breakdown

To obtain the correct item when ordering spares it is essential to quote the model number and serial number.

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Tube kit

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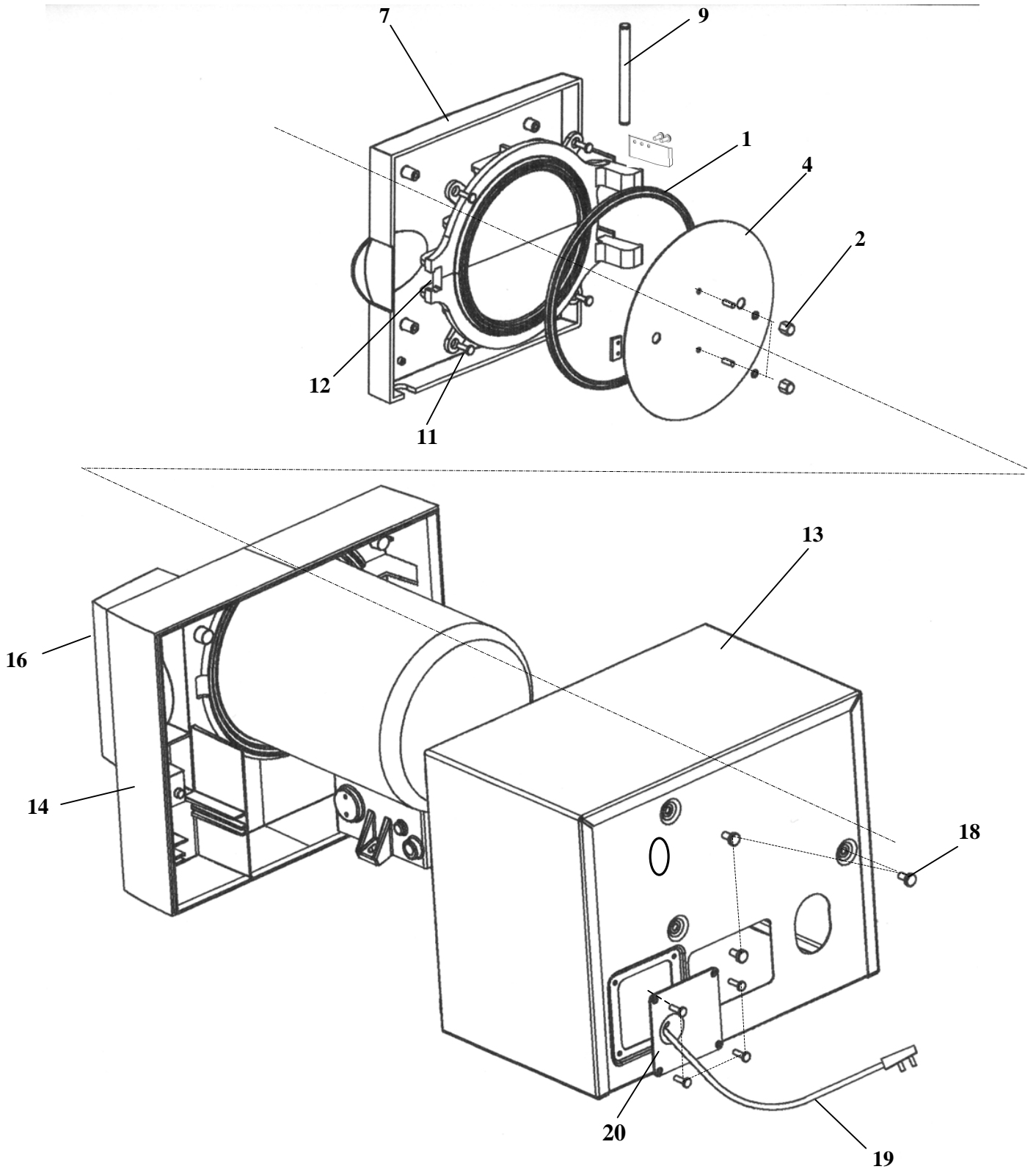


Figure 1

Figure	Indent	Part no.	Description	Quantity
1	1	279011	Kit, Door gasket 250 Gasket, moulding 250 Washer rubber 6mm I/D	1 2
1	2	279100	Kit, Dome nut M6 Nut domed M6 O Ring Screw socket grub M6 x 20 SS	2 2 2
1	3	279104	Kit, entry plug Lock nut 1/4 BSP Plug entry port O Ring	(NI) 2 2 2
1	4	289001	Kit, plate 250 vacuum Plate 250 Nut domed M6 O Ring Screw socket grub M6 x 20 SS	1 2 2 2
1	5	279107	Entry port O-ring	2 (NI)
1	6	279215	Washer sealing 6mm plate 250	1
1	7	289124	Kit, door moulding Moulding door Cable clip 13mm Screw M6 Grommet door mounting Bush	1 1 4 4 4
1	8	279102	Kit, drain tap and pipe clip Valve drain Cable Clip 13mm	(NI) 1 2
1	9	279143	Kit, pin set Pin hinge Pin interlock Circlip pin	1 1 4
1	10	279141	Circlip pin	4 (NI)
1	11	279103	Kit, door screws, grommets and spacers Screw M6 x 20 P/Pan SS Spacer door moulding Grommet door mounting	4 4 4
1	12	279159	Kit, door micro switch Sub Assembly micro switch & plate Plate M / Switch door shut	(NI) 1 1

Figure	Indent	Part no.	Description	Quantity
			Washer M4	2
			Screw pan head M2	2
			Screw M4	2
1	13	279240	Kit, rear case (with feet)	
			Case rear	1
			Screw M4 x 10L PP	6
			Screw M8 x 10L SS pozi head	5
			Foot	2
1	14	279126	Kit, bezel 250	
			Bezel 250	1
			Cable clip 6mm	1
			Cable clip 13mm	4
			Foot bezel	2
			Screw self tapping PP No 6	2
			Door printer sub-assembly	1
			Plate catch self adhesive	1
			Catch magnetic self adhesive	1
1	15	279189	Kit, feet (bezel)	(NI)
			Foot bezel	2
			Screw self tapping PP No6	2
1	16	329003	Decal front panel	1
1	17	279192	Decal no tap water	1 (NI)
1	18	279114	Kit fixing, rear case	
			Screw M4 x 10L PP Z/P	6
			Screw M8 x 10L SS pozi head	5
1	19	279257	Cord set UK	1
		279258	Cord set euro	1
			Screw PT M3	2
			Cable clamp	2
1	20	279260	Moulding rear plate	1
1	21	279000	Kit, printer accessory	(NI)
1	22	289083	Kit, Printer	(NI)
			Printer unit	1
			Roll printer	1
			Handbook printer	1
1	23	279001	Roll printer	1 (NI)
1	24	289102	Ribbon printer	1 (NI)
1	25	289125	Kit, printer door moulding with hinges	(NI)
			Moulding door printer	1
			Hinge printer door	2

Plate catch self adhesive 1

Figure	Indent	Part no.	Description	Quantity
1	26	279200	Printer door catch	(NI)
			Plate catch self adhesive	1
			Catch magnetic self adhesive	1
1	27	279202	Harness printer	1 (NI)
1	28	279216	Hinge printer door	2 (NI)



Figure 2				
Figure	Indent	Part no.	Description	Quantity
2	1	279241	Fan extraction standard Fan Screw self tapping	1 1 4
2	2	279116	Kit, finger guard Guard finger Screw self tapping	1 4
2	3	329007	Kit, bottle used water Container used water Nut 6mm Olive 6mm Locknut M15 Adaptor bulkhead Coil used water	1 1 1 1 1 1
2	4	329008	Kit, tube & harness used water Tube used water Olive Nut Insert Earth lead Kynar sleeve Eyelet M8 Eyelet M3 Decal caution hot	1 2 2 2 1 4 1 1 1
2	5	279190	Foot, rear	2
2	6	279191	Caution hot decal	1

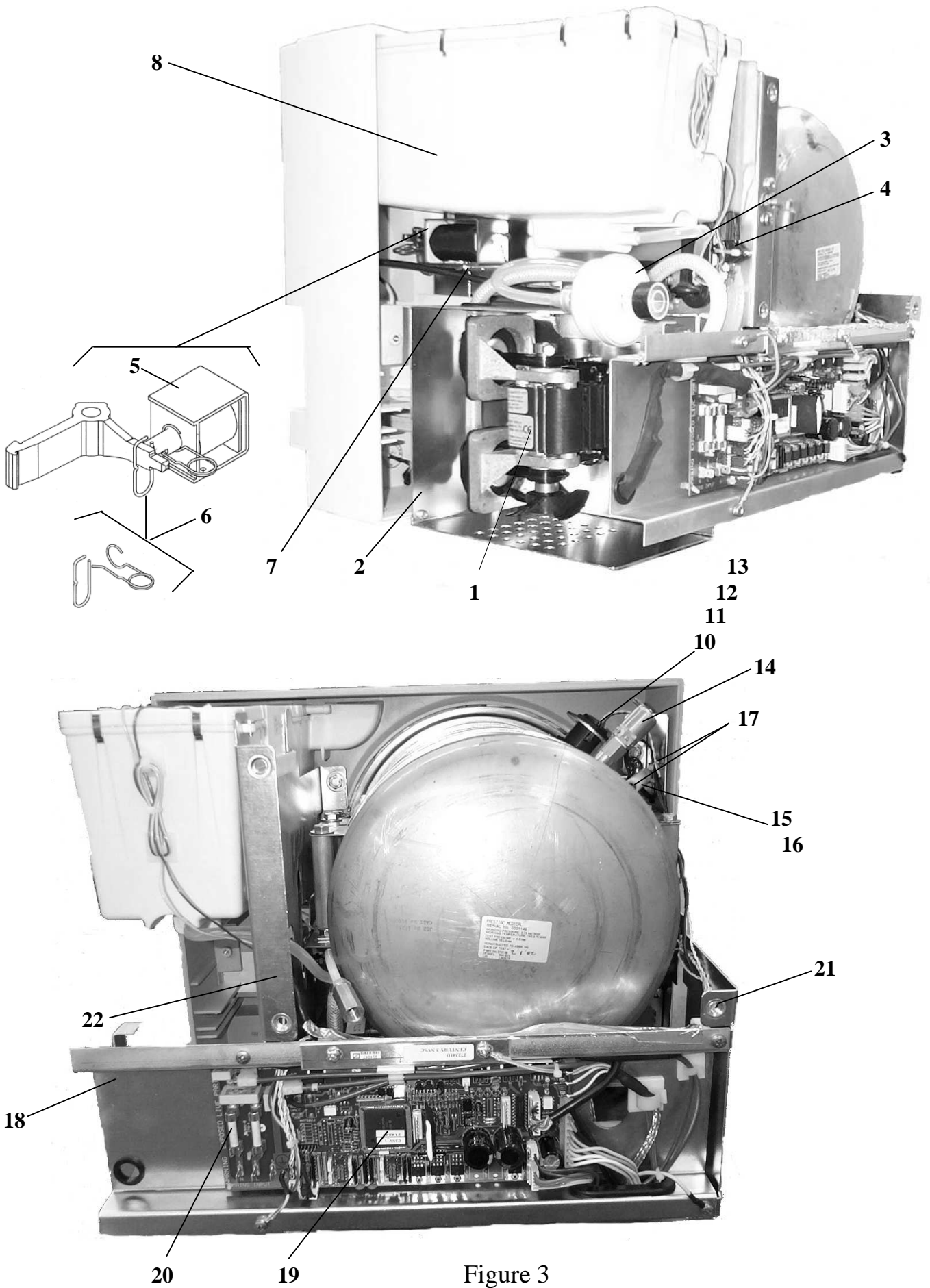


Figure 3

Figure	Indent	Part no.	Description	Quantity
3	1	289127	Pump vacuum sub assembly	1
3	2	289133	Kit, bracket vacuum pump	
			Bracket	1
			Nut, M6	5
3	3	289023	Kit, Filter Air	
			Air filter	1
			Adapter	1
			Clip	2
3	4	NRS	Kit, pressure transducer	
			Pressure transducer	1
			Tube pressure transducer	1
NB. Spare transducers are not recommended unless equipment is available to calibrate the transducer to the power control module.				
3	5	279170	Kit, solenoid door interlock	
			Solenoid	1
			Washer	16
			Screw M3 x 8	4
			Washer M3	4
3	6	279171	Kit spring, door solenoid	
			Spring bias	1
			Spring break link	1
3	7	279163	Kit, solenoid bracket	
			Bracket solenoid	1
			Screw M4	1
			Nut hex M4	1
3	8	309005	Kit, water tank	
			Moulding tank body	1
			Moulding lid	1
			Seal	1
			Clip	12
			Harness sensor	1
			Pin water level	2
			Nut M6	2
			Washer M6 flat	2
			Washer M6	2
			Clip cable	1
			Foot	2
3	9	279417	Kit, seal and clip, water tank	1 (NI)
3	10	289006	Kit, chamber PT100 probe (2 wires)	
			Sensor PT100	1
			Grommet sensor	2
			Tie wrap	2

Figure	Indent	Part no.	Description	Quantity
3	11	279133	Kit, chamber sensor mouldings with M30 nuts Moulding sensor inner Moulding sensor outer Nut M30 x 1.5 6mm thick	1 1 2
3	12	279130	Grommet sensor	2
3	13	279132	Seal sensor to vessel 250	1 (NI)
3	14	279293	Kit, valve pressure relief Valve pressure relief Seal O Ring	1 1 1
3	15	289015	Spring door open	1
3	16	279471	Spring cover	1
3	17	289028	Kit, door open spring pillars Anchor pillar No1 Anchor pillar No2	1 1
3	18	279138	Kit, mounting bracket (power control module) Bracket PSU mounting Module power control 230v	1 1
3	19	309060	Module power control 230v	1
3	20	279122	Fuses M12A Euro	2
3	21	279253	Chassis plate No 1(hinge side)	1
3	22	279252	Chassis plate No 2(central plate)	1
3	23	279162	Spacer plates chassis	2 (NI)
3	24	289024	Kit, grommet chassis plate Grommet 60mm Grommet 15mm	1 (NI) 2 2
3	25	289005	Kit, display module Module display Screw pan head M3 Tie wrap	1 6 4
3	26	289021	Harness display	1 (NI)

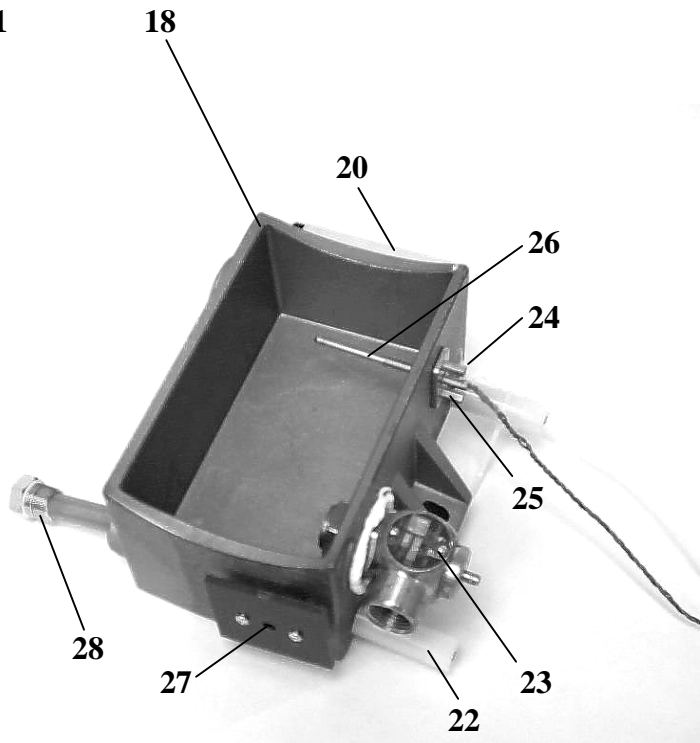
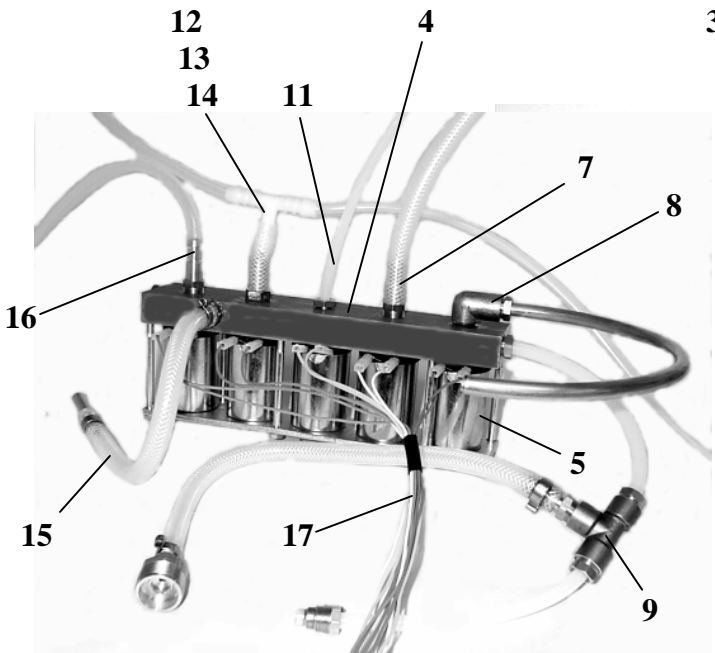
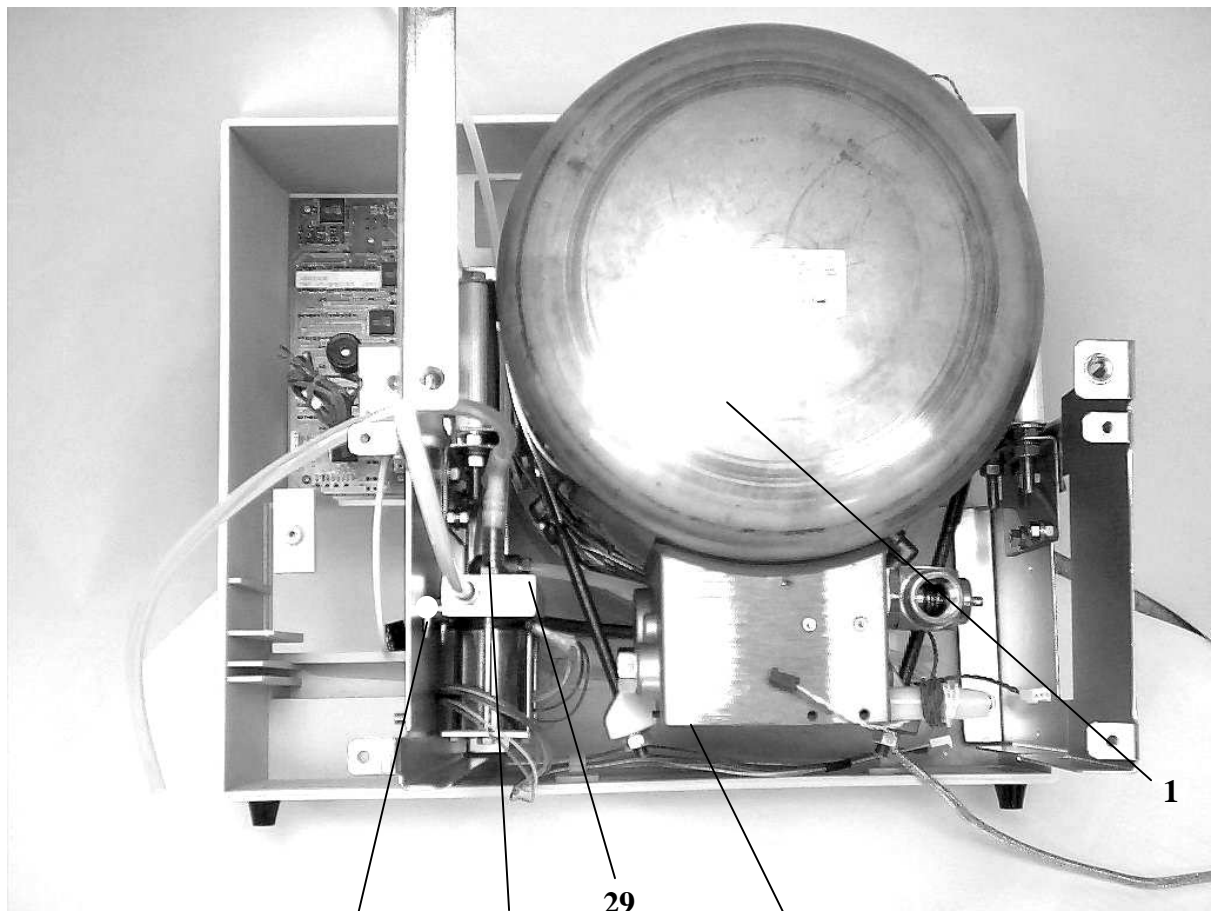


Figure 4

Figure Indent	Part no.	Description	Quantity	
Note: The pressure vessel and lid are treated as a single spares item due to the safety implications				
4	1	289052	Kit vessel 250 x 330 vacuum 16 litre	
			Vessel SS 16 litre	1
			Plate rating vessel	1
			Seal boiler	1
			Lid sub assembly 250 vacuum	1
			Extrusion hinge	1
			Extrusion interlock	1
			Screw set M8 x 120 hexagon	4
			Nut M8 hexagon	6
			Washer M8	8
			Lever	1
			Pin hinge	1
			Pin interlock	1
			Circlip	4
			Washer M8 plain	2
			Moulding sensor inner	1
			Moulding sensor outer	1
			Seal sensor	1
			Grommet sensor	2
			Nut M30	2
			Washer M30	1
			Spring door open	1
			Nut air bleed	1
			Seal air bleed	1
			Elbow equal 8mm O/D	1
			Screw taptite M3 x 5	2
4	2	309007	Kit, thermal jacket	
			Jacket thermal	1 (NI)
			Jacket end cap	1 (NI)
4	3	279159	Kit, door micro switch	(NI)
			Harness micro switch	1
			Plate M / Switch door shut	1
			Nut micro switch M2	2
			Screw pan head M2	2
			Screw M4	2
4	4	309013	Kit, valve block assembly, multi use	
			Valve and pipes sub-assembly	1
			Nut tubing 8mm	5
			Olive 8mm	5
			Ferrule 6mm I/D	5
			Screw M/C M6 x 8 SS hex	2
			Olive 6mm	1
			Nut tubing 6mm	1
			Ferrule 4mm I/D	1
			Clip tube	1

Figure	Indent	Part no.	Description	Quantity
4	4	309001	Kit, valve block assembly, single use	
			Valve and pipes sub-assembly	1
			Nut tubing 8mm	3
			Olive 8mm	3
			Ferrule 6mm I/D	3
			Screw M/C M6 x 8 SS hex	2
			Olive 6mm	1
			Nut tubing 6mm	1
			Ferrule 4mm I/D	1
			Clip tube	3
4	4		Kit, valve block assembly, single use + gauge fittings	
			Valve and pipes sub-assembly	1
			Nut tubing 8mm	3
			Olive 8mm	3
			Ferrule 6mm I/D	3
			Screw M/C M6 x 8 SS hex	2
			Olive 6mm	1
			Nut tubing 6mm	1
			Ferrule 4mm I/D	1
			Clip tube	1
4	4	309030	Kit, valve block	
			Valve block vacuum sub assembly	1
			Screw grub M6 x 20	2
			Spacer valve	2
			Nut chassis plate M6	2
4	5	289079	Kit, valve repair	
			Pin valve sub assembly	1
			O Ring bobbin valve solenoid	1
			O Ring bush valve	2
4	6	309024	Kit, tube (multi use)	(NI)
			Tube valve to tee (air bleed/transducer)	1
			Tube tee to vessel air bleed	1
			Tube tee to pressure transducer	1
			Tube valve to water tank coil	1
			Tube valve to vacuum pump inlet	1
			Tube valve to tee (tank/drain tap)	1
			Tube tee to tank base	1
			Tube tee to drain tap	1
			Tube valve to boiler	1
			Tube valve to filter	1
			Tube vacuum pump to water tank	1
			Nut tubing 8mm	15
			Olive 8mm	15
			Ferrule tube 6	6
			Ferrule tube 4	3

Figure	Indent	Part no.	Description	Quantity
			Ferrule tube 8	6
			Olive 6mm	3
			Nut tubing 6mm	3
			Fitting equal tee 8mm	1
			Clip cable	3
			Fitting 8mm	2
4	6	309017	Kit, tube (single use)	(NI)
			Tube valve to tee (transducer/transducer)	1
			Tube tee to vessel transducer	1
			Tube tee to pressure transducer	1
			Tube valve to vacuum pump inlet	1
			Tube valve to tee (tank/drain tap)	1
			Tube tee to tank base	1
			Tube tee to drain tap	1
			Tube valve to boiler	1
			Tube valve to tee (vacuum pump/coil)	1
			Tube tee to vacuum pump	1
			Tube tee to coil	1
			Tube valve to filter	1
			Nut tubing 8mm	8
			Olive 8mm	6
			Ferrule tube 6	6
			Ferrule tube 4	3
			Olive 6mm	6
			Nut tubing 6mm	6
			Fitting equal tee 8mm	1
			Compression tee	1
			Clip cable	3
			Fitting 8mm	2
4	7	289090	Kit, tube, valve to vacuum pump inlet	
			Tube valve to tee evacuation	1
			Nut tubing 8mm	2
			Olive 8mm	2
			Ferrule Tube 6mm I/D	1
4	8	289047	Kit, valve to boiler drip tray	
			Tube short ABD	1
			Nut tubing 8mm	1
			Olive 8mm	1
4	9	309000	Kit, tube, vessel to transducer tee	
			Tube 8mm	1
			Nut tubing 8mm	2
			Olive 8mm	2
			Ferrule 6 I/D	2

Figure Indent	Part no.	Description	Quantity
4	10	309002	Kit, tube, gauge fitted (NI)
		Gauge	1
		Tube	1
		Olive	2
		Nut	2
		Ferrule	2
		Adapter	1
		Fitting	1
4	11	279193	Kit, tube, valve to water tank (multi use)
		Tube valve to tank vent	1
		Ferrule tube 4mm I/D	2
		Olive 6mm	2
		Nut tubing 6mm	2
4	11	309028	Kit, tube, valve to tee, water outlet coil (single use)
		Tube valve to tee/vacuum pump/coil	1
		Tee piece	1
		Ferrule tube 4mm I/D	5
		Olive 6mm	5
		Nut tubing 6mm	5
4	12	279196	Kit, valve to tee (water feed/drain tap)
		Tube valve to tee	1
		Fitting equal tee 8mm	1
4	13	279195	Tube, tee to water tank
		Tube silicone 8mm x 6mm	1
4	14	279194	Kit, tube tee drain tap c/w fittings (multi use)
		Tube 8mm	1
		Connector	1
4	15	289089	Tube, valve to boiler
		Tube silicone	1
		Clip tube	1
		Fitting 8mm	1
		Nut 8mm	1
		Olive 8mm	1
4	16	289091	Kit, tube, valve to air filter
		Tube valve to air filter	1
		Nut tubing 8mm	1
		Olive 8mm	1
		Ferrule Tube 6mm I/D	1
4	17	289086	Harness water valve vacuum
			1

Figure Indent	Part no.	Description	Quantity
4	18	289045	Kit, boiler, 250 mm O/D vessel, 230V (16 litre)
		Boiler vessel	1
		Seal boiler 250	1
		Thermistor	1
		Element insulator	2
		Washer ASME valve	1
		Grommet sensor	1
		Stud self-clinch M3	4
		Tray air bleed	1
		Screw M4 x 8 PP	2
		RTV	A/R
4	19	279212	Kit, fixing boiler 250mm
		Strap boiler to vessel	1
		Pin strap cross drilled	1
		Bolt M8	2
		Washer M8	2
		Nut M8	2
4	20	309023	Kit, condensate tray
		Tray air bleed	1
		Screw M4 x 8 PP	2
4	21	279154	Seal, boiler 250
			1 (NI)
4	22	279155	Element terminal insulator
			2
4	23	279157	Kit, ASME valve 2.65 bar (with nut and seal)
		Valve ASME Omega MKII	1
		Nut ASME valve	1
		Washer ASME valve	1
4	24	279152	Kit, boiler thermistor
		Thermistor	1
		Strap boiler to vessel	1
4	24	279242	Thermistor boiler
		Pin strap cross-drilled	1
		Bolt M8 x 120L hex head SS	2
		Washer plain M8 SS	2
		Nut hex M8	2
4	25	279151	Kit, clamp plate and nuts
		Plate sensor fixing	1
		Nut extended M3	2
4	26	289011	Kit, boiler probe PT100 (Vacuum)
		Sensor pt100 water level	1
		Grommet sensor	1

Figure Indent	Part no.	Description	Quantity	
4	27	279203	Kit, thermal cut out backing board	
		Board thermal cut out	1	
		Screw pan head M3	2	
		Washer single coil M3	2	
4	28	279176	Filter water	1
4	29	289055	Heater element 230v 350w174mm	1
4	30	279183	Strap heater support SS	2
4	31	279188	Sensor drying cycle element Thermistor drying cycle	1
4	31	279255	Thermistor drying	1

Figure	Indent	Part no.	Description	Quantity
5	1	279229	Carrier furniture 16 litre 6 tray	1 (NI)
5	2	279006	Tray 284	1 (NI)
5	3	279009	Furniture pouch rack 282	1 (NI)
5	4	279007	Handle furniture carrier	1 (NI)
5	5	329005	Manual	1 (NI)
5	6	329001	Helix test pack	1
5	7	279476	Kit, tube	(NI)
			Tube Teflon 8mm	1
			Tube Teflon 6mm	1
			Tube SI/flexi	1
			Tube SI 8 x 5	1
			Tube SI 8 x 6	1
			Strap	7
			Nut tubing 8mm	5
			Olive 8mm	5
			Ferrule tube 6	5
			Ferrule tube 4	5
			Olive 6mm	5
			Nut tubing 6mm	5
5	8	279477	Kit, Seals	(NI)
			Gasket 250	1
			O Ring Bush valve solenoid	2
			Seal air bleed	2
			Grommet sensor	1
			Seal, grommet sensor	2
			O Ring 13mm	2
5	9	279208	Kit, fixing M3	(NI)
			Screw taptite M3 x 5L	2
			Screw pozi M3 x 10	2
			Screw pan head M3	10
			Nut extended M3	4
			Screw M3 x 8 PP plastech	2
5	10	279209	Kit, fixing M4	(NI)
			Screw M4 x 8 PP	4
			Screw M4 x 16 PP	1
			Nut hex M4	5
			Screw M4 x 10L PP	6
			Screw M4 x 20 pozi csk	4
5	11	279210	Kit, fixing M5	(NI)
			Screw M5 x 10L SS	13
			Washer M5	6

Figure Indent	Part no.	Description	Quantity
5	12	279214	Kit, fixing M6 (NI)
		Screw socket grub M6 x 20 SS	1
		Washer copper M6	1
		Nut domed M6 SS	1
		Screw M6 x 20 P/Pan SS	4
		Screw M/C M6 x 8 SS hex	2
		Nut chassis plate M6	2
5	13	279211	Kit, fixing M8 (NI)
		Bolt hex M8 x 120	4
		Nut hex M8	13
		Washer M8	14
		Bolt M8 x 120L hex head SS	2
		Washer plain M8 SS	6
5	14	279166	Kit fixing, chassis plates to vessel (NI)
		Packer chassis plate	2
		Washer plain M8	2
		Nut hex M8	4
		Washer M8	2
		Nut extrusion fixing M8	2
		Screw M8 x 10L SS hex head	1
		Screw M8 x 20L pozi pan	5
		Locknut M8 s/steel A2	2