

# MODEL 9002 RIPENING SYSTEM USER MANUAL



**VERSION 2.00**

**JULY 2002**

**INDEX / UNPACKING & INSTALLATION CHECKS**

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**1 UNPACKING & INSTALLATION CHECKS**

- 1.1 Remove machine from packaging & save packaging for re-use when returning machine for servicing or warranty repairs.
- 1.2 Unscrew the tank lid & remove the mains lead which is packed inside.
- 1.3 Prior to connecting to electrical supply, it is recommended that the power outlet to be used is checked for correct polarity & good earthing (grounding). There should not be more than approx 50 milliVolts AC between the Neutral & Earth (Ground) pins on the power outlet. The machine can operate safely with reversed live & neutral supply, using a non polarised socket outlet as is used in continental Europe. The machine has internal fuses in the LINE & NEUTRAL which are not user accessible without dismantling.
- 1.4 If connecting by means of a three phase plug, ensure that the mains lead is connected with the correct polarity to Live & Neutral and not across two phases. Also ensure that the earth connection is properly connected.

## UNPACKING & INSTALLATION CHECKS

### 1.5 Mains Lead Colour Code

<b>Live (Line)</b>	Brown
<b>Neutral</b>	Blue
<b>Earth (Ground)</b>	Yellow/Green

### 1.6 Power Requirements

The maximum supply voltage is **280 Volts AC 50/60 Hz**.

Above 260 Volts, operation is automatically interrupted to protect the components from damage, with automatic resetting when supply returns to safe limits.

Nominal working voltage is **200 to 250 Volts at 1,2 Amps**

Max power during warm up is **234 watts**, and average power consumption over a 6 hour ripening cycle is **95 watts**.

### 1.7 External current Protection.

No external protection is necessary, however if a fused plug such as the UK 13A plug is used, any fuse from **4 - 13 A** is suitable.

1.8 Having satisfied that the power supply is correctly connected, the machine can be put into service. We recommend that the machine be placed in the ripening room at a height of **3 ft ( 1 Metre )** above floor levels, preferably positioned so that maximum air flows across the machine, & with a minimum space all round the machine of **20" (500 mm)**. Also ensure the machine is clear of any fork lift trucks or any other mechanical handling equipment that could cause damage.

### 1.9 Installation Options

The **VENTECH FRUIT RIPENING SYSTEM** is normally used as a portable unit which is plugged into the room to be gassed, then moved onto the next room. However for high volume ripening rooms, there are available certain add-on options as follows:

#### 1.9.1 Gas Pipe Adaptor

This option also permits mounting the generator outside the ripening room. The

## **UNPACKING & INSTALLATION CHECKS**

exhaust nozzle of the generator can be replaced with a **1/8 " NPT** tube connector obtainable from any hydraulics supplier, that allows connection to a gas pipe.

The gas pipe in turn can be connected to a gas manifold feeding individual rooms, with the gas supply to each room controlled by a butterfly or ball valve.

This option is particularly useful for converting an existing bottled gas fed ripening room to catalytic generator operation.

### **1.9.2 External Tank Option**

This option can be used in conjunction with the previously described options to enable the gassing period to be extended by means of an external tank mounted outside the ripening room, which increases the capacity of the generator thus extending the gassing time.

This external tank is connected to a 1/8" NPT bulkhead connector on the side of the machine which is supplied as part of the external tank option kit, and connected inside the machine directly to the solenoid valve, replacing the tank. The external tank can be manufactured locally to VENTECH specifications, or supplied by VENTECH. The tank capacity can be sized to suit local Health & Safety codes which is usually 20 Litres. However this & other tanks can be in turn refilled automatically from a 210L drum outside the building.

### **1.9.3 Option Panel**

There is a small panel in the side of the electronics module which can be removed & replaced with additional interface electronics for connection to an automatic remote supervisory system, using a programmable logic controller (PLC) or computer, in conjunction with external motorised damper valves & ethylene gas sensors.

### **1.9.4 Variable Gas Rate Control.**

This option plate can also be removed & replaced with a variable rate control should this be so desired.

## OPERATION

### 2 OPERATION

- 2.1 Unscrew the lid of the tank & fill with 1 litre ( US 1 Quart ) of VENTECH ripening fluid or an approved equivalent. The tank holds 1.5 Litres of fluid, but has a dead volume of 0.25 L when the tank is empty. The tank can be filled up to the neck initially, but otherwise 1 litre is sufficient for one ripening session.

**WARNING** - The ripening fluid is highly inflammable & of low flashpoint.

Disconnect from electrical supply by unplugging before filling.

Keep away from naked flame when filling & preferably fill in an open space or well ventilated room.

The use of solvents not approved by **VENTECH** is not recommended since, although apparently normal ripening will be achieved, accelerated degradation of system components occur, resulting in expensive long term repair costs.

- 2.2 Place generator in ripening room & plug in to power outlet. The control panel status lights will light as follows:

<b>REACTOR HEATING</b>	Green
<b>SYSTEM NORMAL</b>	Green
<b>CONTROL ON</b>	Green
<b>TEMP LO</b>	Yellow

- 2.3 After about 10 minutes the Yellow **LO TEMP** light will go out & the **SOV** lamp will start to flash briefly at approx 9 second intervals, accompanied by a click. This is the solenoid valve opening allowing ripening fluid to be admitted to the reactor to be converted to ethylene. Ethylene gas will be emitted from the nozzle on the top of the machine.

**CAUTION - THE EXHAUST NOZZLE OPERATES AT OVER 300 DEG C. DO NOT TOUCH WHEN OPERATING OR FOR HALF AN HOUR AFTER SWITCHING OFF!**

After reaching operating temperature the **HEAT & CONTROL** lights will flash on & off as the system enters pulse width modulation mode which gives proportional control of the element temperature. This gives very accurate control of the catalytic conversion temperature, and by preventing temperature cycling of the element, gives longer

element life than on-off control.

- 2.4 After approx **6 - 8** hours operation, the ripening fluid will have been used up & the tank will be empty. At this point, the low fluid sensor will detect the out-of-fluid condition, and switch off power to the reactor & the solenoid valve. The **FLUID TANK EMPTY** (yellow Lamp) will turn on to show that the ripening initiation process is completed

**Note:**

It is important that the machine is level, otherwise the fluid level sensor will not sense the low level condition properly, & not switch off.

2.5 **WARNING INDICATORS.**

2.5.1 **TEMP TOO HI** (red light )

After start-up, the temperature will sometimes initially overshoot the correct set-point, causing the **TEMP TOO HI** red light to turn on. This is no cause for alarm and should go out after a few minutes & will not come on again.

This can also occur in the event of a power failure when power is restored. This provides backup protection to avoid incorrect gas generation which could cause degraded ripening. This also provides back-up low fluid protection if the machine is not level.

2.5.2 **VOLTS TOO HIGH** (red light)

If this light comes on it is an indication that the mains power supply voltage is too high ( **above 260 Volts** )Normally, the nominal voltage, depending on country is from **220 to 250 Volts**. Normal variations in supply voltage should be within **+/- 6% (UK) to +/- 10% ( S Africa)**

It is unlikely that any country will have a supply that intentionally exceeds the 10% limit, although under fault conditions, or very heavily loaded distribution systems, the voltage can exceed these limits late at night when the gas generator will still be working but most industrial & domestic load is switched off. In some developing countries, these limits can also be exceeded.

For this reason, the Ventech gas generator has a built-in protection circuit which will automatically switch off once this safe working limit has been exceeded without damage to the components. After supply has returned to normal, the **HI VOLT** light will go out & normal operation will be resumed.

Note further that the **VOLTS TOO HI** indication is outside the control of the gas generator. It is not a machine fault as such, being an external fault resulting from

## OPERATION

incorrect supply voltage.

### 2.5.2(Cont)

**A MACHINE SHOWING THIS INDICATION SHOULD NOT BE RETURNED FOR SERVICE WITHOUT FIRST CHECKING THAT THE SUPPLY VOLTAGE IS IN FACT TOO HIGH, BY MEASURING WITH A DIGITAL VOLTMETER, PREFERABLY OVER A LONG PERIOD OF TIME. PLEASE REMEMBER THAT THIS CONDITION WILL OCCUR INTERMITTENTLY & IT IS IMPORTANT TO HAVE YOUR MACHINE CONNECTED TO THE SUPPLY WHEN CHECKING. FOR EXAMPLE IF YOU ARE USING THE MACHINE AT NIGHT, WHEN THE VOLTAGE IS NORMALLY HIGHER & YOU SEE THIS INDICATION, YOU MIGHT THEN CALL AN ELECTRICIAN FIRST THING THE FOLLOWING MORNING ( WHEN THE VOLTAGE IS NORMALLY LOWEST) & HE WILL THEN REPORT THAT THE VOLTAGE IS NORMAL**

### 2.5.3 TANK TEMP TOO HI ( Red light )

This light will be lit if the temperature at the bottom of the reactor exceeds safe limits, and when lit, switches off power to the reactor & solenoid valve. This can be caused by several reasons.

#### (a) Machine not level.

This results in the ripening fluid not being able to flow into the reactor when nearly empty. Since the cooling effect of the ripening fluid is no longer applied to the base of the reactor, the temperature will tend to rise, with the risk of damage to the reactor element terminals. This protection, by removing power to the element, maintains the temperature within safe limits & therefore provides protection, should the machine not level & also provides back-up low alcohol protection & back-up over temperature protection in case of failure of the element control circuit & switching device.

#### (b) Element failure

The element, as most heating elements has a finite working life and will eventually require replacement. When it eventually fails, it can possibly overheat, by-passing the control system. Normally this will be picked up by the **TEMP TOO HIGH** protection, but should this fail for any reason, the **TANK TEMP TOO HI** protection will provide backup protection and prevent any risk of fire or damage to the metalwork of the machine.

#### (c) Total control failure

In the event of a direct lightning strike of magnitude too great for the lightning protection, the **HI TEMP** protection may fail and the **TANK TEMP TOO HI** protection provides back-up protection to prevent dangerous high temperatures occurring which could cause a fire. This has happened on more than one occasion with machines made by other manufacturers who do not offer such comprehensive protection.

Note that it is extremely unlikely that this will occur, since a lightning strike or surge greater than the capacity of the ultra fast surge diodes will normally blow one or other

## OPERATION

the mains fuses.

### 2.5.4 INDICATOR LAMPS COLOUR CODES

**Green** Normal operation modes

**Yellow** Temporary operating modes such as low fluid or low temp on startup.

## 3 ~~Red~~ **SERVICING** Abnormal operating modes.

### 3.1 Catalyst Changing

The catalyst used in the machine will need changing after after between **6 & 12** months use. Due to the restrictions imposed by Customs & Excise departments, the **Ventech Ripening Fluid** contains de-naturants which will eventually poison the catalyst causing reduced gas generation. **We also recommend that if you are have problems ripening, that you check the gas levels with with a gas sampler such as the GASTEC** details of which are at the end of the manual.

This is supplied by us, & it is possible that a group of ripeners in one area share the cost of one kit, since it is only used infrequently.

We recommend that the user checks the catalyst once a month after the first six months operation from new or after a catalyst change, and examine the catalyst by unscrewing the exhaust nozzle, when cold, and viewing the catalyst, which consists of small white tubes filling the reactor. These should be loose & not welded together by carbon. If left too long, it is difficult to remove the old catalyst, and will require an exchange reactor. Once the catalyst starts getting heavily carbonated, it should be emptied by turning the machine upside down and shaking out the old catalyst. It may be necessary to loosen the catalyst with a long thin screwdriver or skewer. Once all the catalyst is removed, the reactor can be refilled with a new catalyst pack, taking care not to overtighten the exhaust nozzle when replacing. When refilling, some of the catalyst consist of triangular ceramic chips that should be put in first, followed by the tubular active catalyst.

Due to the low cost of the catalyst, it is better to change it sooner, rather than later. This will be done automatically, if your machine is covered by a service contract, or sent in for any service or repairs

**NB: IF YOU LEAVE THE CATALYST TOO LONG, IT MAY BE IMPOSSIBLE TO REMOVE THE OLD CATALYST, IN WHICH CASE A COMPLETELY NEW REACTOR WILL HAVE TO BE PURCHASED, WHICH IS THE MOST EXPENSIVE COMPONENT IN THE MACHINE.**

## **OPERATION / SERVICING**

### **3.2 FAULT FINDING**

Before returning a machine for repair a few simple checks should be carried out, which could save you the transport costs & downtime involved in sending a machine in to your service centre.

### **3.3 Condition - No lights lit**

3.3.1 First check the electrical supply to your machine, and if you have testmeter check that you have mains supply across the two outside pins on the connector that plugs into the socket.

3.3.2 If there is supply, then disconnect the supply cord & check the mains fuses. There are two mains fuses in the supply to the machine, plus one in the mains plug if using a 13A (UK) square pin plug. The 13A plug can be fused 4 -1 3A HRC fuse. The supply fuses in the machine are 5X20 Amp 3.14A or 4.0A Ultra Fast fuses. If you use the normal fast blow glass fuses. you will now have the same amount of surge protection. so replace these by the correct type as soon as possible. Check the mains cord first but swapping it with a computer or electric kettle cord

3.3.3 These fuses are in a small drawer in the side of the power inlet connector. They are accessed by first removing the mains cable, then pulling the drawer open using a finger nail, small knife or small screwdriver. If either fuses is blown, it should be replaced.

3.3.4 If nothing is found wrong & you have spare electronic boards proceed as follows:

#### **3.3.5 Removal of electronic boards**

Remove the four M8 X 8 countersink screws retaining the cover of the electronics module, Remove the two grey ribbon cables by unplugging. Unscrew the 4 X M3X6 screws retaining the top PCB. This is the control board ( the one with 9 lights). Remove the two green terminal strips in the bottom (Power Board) by pulling down to unplug. There is no need to undo the terminal screws. Now unscrew the 4 nickel plated pillars to release the power board. Refitting is the reverse of removal. The two ribbon cables are marked PL1 & PL2.

3.3.6 If after carrying out the above process, the machine is still not functioning, it will have to be returned to the factory.

### **3.4 Condition - Lights on but no heating or valve operation.**

3.4.1 Remove electronics cover as previous described and with the mains power disconnected, check the fuses on the power board. You can get at them with the control board in place, but it is easier to remove it. The left hand fuse is for the reactor fude & the right hand one for the solenoid valve. The ratings are 2.0 & 1.0 A respectively. They are normally fast blow glass 5 X 20 mm fuses

## SERVICING

- 3.4.2 Re-check the machine and if heating, run for a couple of hours on test before putting back into service. If the fuse blows again, return the machine for service for element replacement.

**Note:**

The supply line fuses generally only blow because of power surges or lightning. Generally line surges blow the Line fuse, & Lightning surges blow the Neutral fuse.

The power board fuses generally only blow due to element failure of short circuit solenoid coil. Solenoid failure is extremely rare, as the solenoid is only open for a fraction of a second at a time.

It is most unusual for an element failure to blow the inlet fuses as well, although it can happen, However if the element is blown as a result of a lightning strike, it will blow both fuses.

**PLEASE DO NOT REPLACE FUSES BY A LARGER TYPE IF THEY BLOW. ONLY REPLACE A FUSE ONCE, THEN IF IT BLOWS AGAIN, RETURN MACHINE FOR SERVICE. IF THE INLET FUSE BLOWS AGAIN AFTER SEVERAL HOURS OPERATION, THIS COULD BE CAUSED BY REPEATED MAINS SURGES, ESPECIALLY IF IT IS DURING THUNDERSTORMS.**

**FAILURE TO OBSERVE THIS COULD RESULT IN ADDITIONAL DAMAGE.**

If, after carrying out the above fuse checks, the machine is still not heating (indicated by the **LOW TEMP** light staying lit), the you need to return the machine to have the reactor element replaced.

### **3.5 Condition - lights lit, but incorrect operation.**

First check through the chapter on operation, for a description of the status lights operation. If this does not resolve the problem, generally this is due to a fault on the control board caused by surge damage. If you have a spare card, try replacing it, otherwise return the whole machine for service. **Caution** - the jumper at the bottom of the card must be placed in the **DIS** position ( right hand side ) unless you adjust the R7 control, which requires the use of a digital multimeter.

**IMPORTANT - ALLOW MACHINE TO COOL DOWN FOR TWO HOURS BEFORE PUTTING INTO THE POLYSTYRENE PACKAGING TO RETURN FOR SERVICE.**

## 4 RIPENING GUIDES

### 4.1 BANANAS

For best taste, **ripen bananas according to the following schedule**, then hold at **14.5 Deg C** for delayed shipment. Ensure that bananas, are not chilled as this can cause damage.

To be able to provide your customers with a steady supply of good quality ripe bananas, they must be harvested when green. Mature green bananas will ripen after they are picked just as they would on the plant. A low concentration of ethylene gas, is mixed with the air in a ripening room and the temperature and relative humidity are controlled. The banana ripens naturally and nothing is added to change the natural appearance or taste of the fruit. The banana itself produces ethylene when ripening, and adding external ethylene just triggers the natural ripening process. No ecological hazard is produced and ethylene gas is "ozone friendly". No CFCs are produced as by-products in the **VENTECH RIPENING SYSTEM**, or any other environment-hostile by-products.

#### 4.1.1 TRANSPORTATION AND HANDLING

To prevent chill damage and loss of flavor, the pulp temperature of the banana should never be below **14.4 degrees C** while in transit.

Bananas should always be handled with care. They are quite tough, but can be easily damaged. Do not let bananas stay in cold or hot storage areas during truck-to-truck or truck-to-rail transfers during transit. The ideal temperature range is **14- 18 degrees C**

**RIPENING GUIDES**

<b>RECOMMENDED GUIDE FOR BANANA RIPENING</b>						
<b>Day</b>	<b>Ripening Schedule - no of days</b>					
<b>No</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	
<b>1</b>	17.8	16.7	16.7	15.6	14.4	<b>GAS</b>
<b>2</b>	17.8	16.7	16.7	15.6	14.4	
<b>3</b>	16.7	16.7	15.6	15.6	14.4	
<b>4</b>	15.6	16.7	15.6	15.6	14.4	
<b>5</b>		15.6	15.6	15.6	14.4	
<b>6</b>			14.4	14.4	14.4	
<b>7</b>				14.4	14.4	
<b>8</b>					14.4	
<b>STORE AT 14.4 Deg C for delayed shipment</b>						

**Notes:**

1. Humidity should be maintained at **80 to 95 % RH**.
2. Temperatures are pulp temperatures not air temperatures.
3. Ventilate ripening room for **10 - 20 minutes** every **24 hours**. The **VENTECH RIPENING SYSTEM** will produce ethylene gas continuously for **6 - 8 hours**. Provide the room is reasonably gas tight, the room can be kept closed for the remainder of the 24 hour period, then refilled whilst the doors are opened for ventilation. Maintain gassing until colour breaks. Usually gassing only required for first day for rooms up to **600 box** capacity. **100 - 150 ppm** of ethylene is required for initiating ripening. Excess will not cause any harm. The **VENTECH GAS GENERATOR** will produce in excess of the this amount for ripening rooms up to **600 box** capacity.
4. The generator will switch itself off automatically when the alcohol is finished. No harm will be done leaving in the room after gassing. but it should be removed and stored in an office or dry store room once ripening is finished.
5. Ensure boxes are stacked on pallets with **500 mm** space between adjacent stacks and walls to ensure good air circulation.

4.2

<b>RECOMMENDED GUIDE FOR TOMATO RIPENING</b>									
<b>Day</b>	<b>Ripening Schedule - no of days</b>								
<b>No</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	
<b>1</b>	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	<b>GAS</b>
<b>2</b>	21.1	21.1	21.1	21.1	20.0	20.0	20.0	20.0	<b>GAS</b>
<b>3</b>	20.0	18.3	18.3	18.3	16.7	15.6	15.6	15.6	
<b>4</b>	18.3	18.3	16.7	16.7	16.7	15.6	14.4	14.4	
<b>5</b>	16.7	16.7	15.6	15.6	15.6	14.4	14.4	13.3	
<b>6</b>		15.6	14.4	14.4	14.4	14.4	14.4	13.3	
<b>7</b>			13.3	13.3	13.3	13.3	13.3	13.3	
<b>8</b>				12.8	12.8	12.8	12.8	13.3	
<b>9</b>					12.8	12.8	12.8	13.3	
<b>10</b>						12.8	12.8	12.8	
<b>11</b>							12.8	12.8	
<b>12</b>								12.8	
<b>STORE AT 12.8 Deg C for delayed shipment</b>									

## **RIPENING GUIDES**

### **4.3 AVOCADOES**

Gas for **12 hours at 23 Deg C** then ventilate. Maintain temperature till ripe (2-3 days total).

Minimum safe storage temperature : **4.5 to 13 Deg C.**

### **4.4 CITRUS**

Gas for 12 hours at 27 Deg C then ventilate. Maintain temperature till ripe ( 3-4 days total)

Minimum safe storage temperature : **3 Deg C.**

### **4.5 MANGOES**

Wash in hot water at **53 to 55 Deg C** for **5 mins**, then pack into lug boxes & stack in ripening room.

Gas for **12 hours at 30 to 32 Deg C** then ventilate. Maintain temperature till ripe ( 2 days total). Reducing temperature to **24 to 25 Deg C** will extend ripening time to 2 1/2 to 3 days. NB Mangoes can also be mixed with bananas, which are ripened at 15 to 18 Deg C.

Gas for **12 hours at 27 Deg C** then ventilate. Maintain temperature till ripe ( 3-4 days total)

Minimum safe storage temperature : **10 to 13 Deg C.**

### **4.6 OTHER FRUITS**

**Many other fruits can be ripened with the VENTECH RIPENING SYSTEM. Please contact us or your distributor/agent for details.**

### **4.7 TOBACCO**

**Tobacco can be successfully cured with a 15% reduction in curing time. Please contact us or your distributor/agent for a copy of our tobacco curing guide.**

## **RIPENING ROOM MAINTENANCE**

### **5 RIPENING ROOM MAINTENANCE**

A good preventative maintenance program is the best way to avoid ripening room problems. We would like to recommend the following:

#### **5.1. TEMPERATURE CONTROLLERS AND PROGRAMMERS.**

Regular calibration checks should be carried to avoid incorrect ripening room temperatures.

- 5.1.1 Check capillary tubing to be sure it is free of kinks. Capillary tube & bulb temperature controllers should be replaced if possible with an electronic temperature controller, preferably with a digital display reading to 0.1 Deg C.

Thermocouple type controllers should be avoided, since the accuracy is not so good at low temperatures. Platinum resistance (Pt100) type controllers are best.

The capillary type controller has too high a differential ( Difference between switching off and switching on ), to give accurate temperature control, and the capillary tube is easily damaged and cannot be replaced. If damaged, the complete instrument has to be replaced.

- 5.1.2 An independent high/low temperature alarm & chart recorder is recommended especially if you are in an area that has a high incidence of power failures.

#### **5.2 AIR HANDLING & LEAKS**

- 5.2.1 Evaporator & condensor coils should be cleaned at least every 6 months.

- 5.2.2 Check drain lines regularly.

- 5.2.3 Check compressors, fan motors, belts, etc. and service as recommended by manufacturer.

- 5.2.4 Replace damaged or worn door gaskets as necessary.

- 5.2.5 Check rooms for gas tightness at least once a year.

## **RIPENING ROOM MAINTENANCE**

### **5.3 ELECTRICAL**

- 5.3.1 Check that your electrical panel has protection against Low voltage, high voltage, phase failure, phase reversal and a three minute timer to prevent damage due to operation of the power company's auto-reclosers. Any of these faults will damage your compressors and air circulation fans.
- 5.3.2 If not, we recommend that you ask your electrician to fit suitable equipment. The **VENTECH THREE PHASE LOAD PROTECTOR** combines all these functions in one unit, and one unit can protect a multiple compressor installation.
- 5.3.3 If you use a standby generator, if not already automatic, have it converted for automatic starting and stopping. A **VENTECH AMF GENERATOR CONTROLLER** can be retro-fitted to virtually any electrically started generator, to provide this facility.

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### **WEBSITES**

For further information on Ripening & other Post Harvest Technology matters, we can recommend the following websites, whose URLs are given.

**VENTECH AGRIONICS** <http://www.ventechagrionics.com>

Our website- will contain downloadable copy of this manual in acrobat .pdf format , news & other product information.

**UNIVERSITY OF CALIFORNIA ( DAVIS)** The leading source of info on Post Harvest Technology <http://postharvest.ucdavis.edu/>

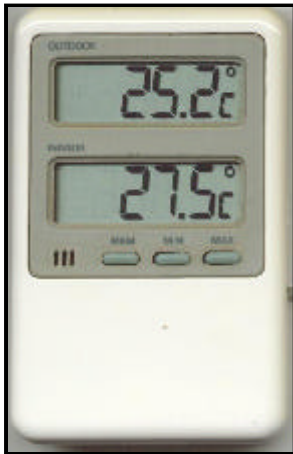
**COMMONWEALTH AGRICULTURAL BUREAU (CAB)** <http://www.cabi.org/>

**CHIQUITA BANANAS** <http://www.chiquita.com/>

**FOOD & AGRICULTURAL ORGANISATION** <http://www.fao.org/>

Any other new or interesting & relevant websites & these above will be listed in the **LINKS** section of our website.

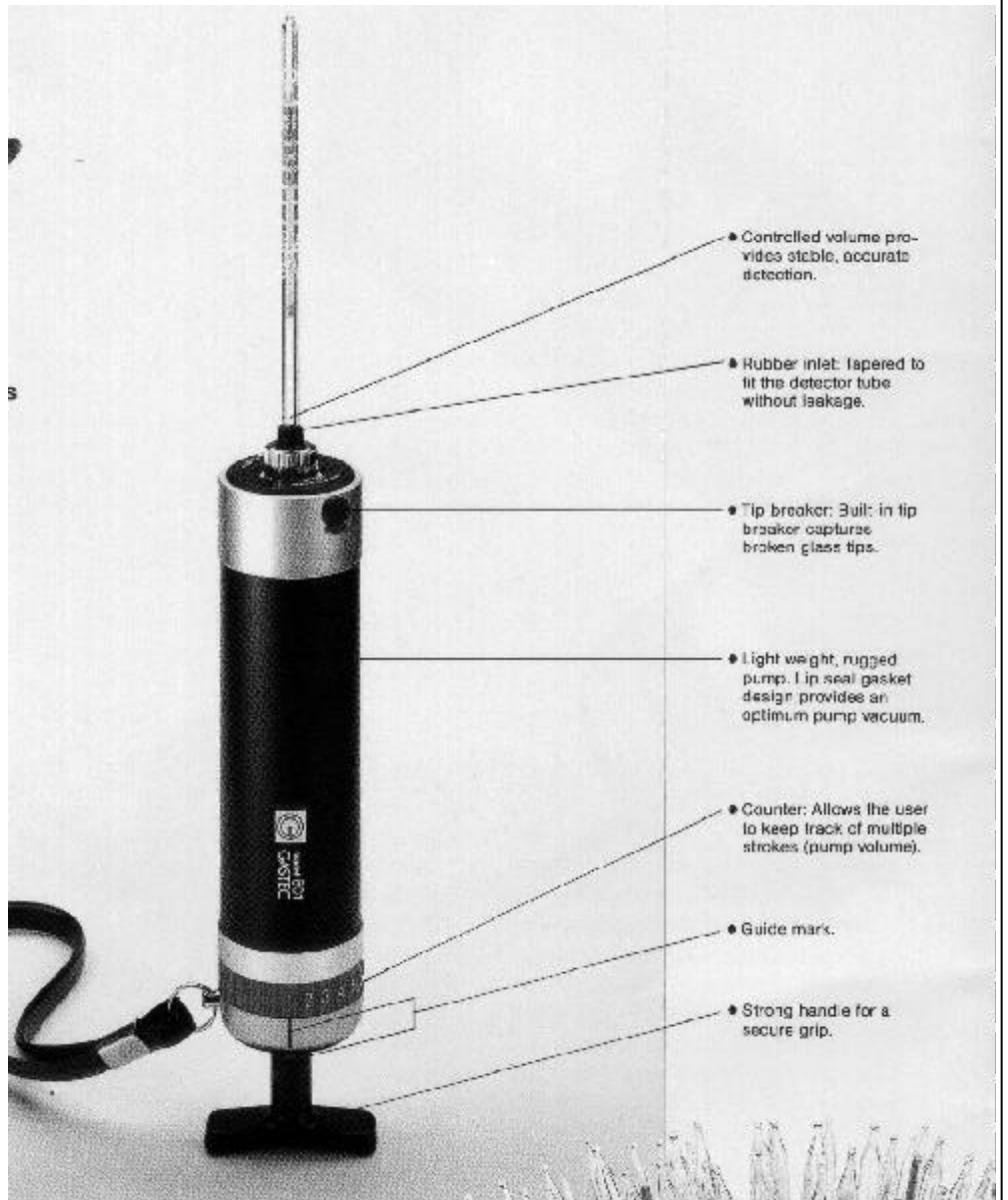
RIPENING ROOM INSTRUMENTATION



DIGITAL MAX-MIN THERMOMETER



GS90USR2



- Controlled volume provides stable, accurate detection.
- Rubber inlet: tapered to fit the detector tube without leakage.
- Tip breaker: Built in tip breaker captures broken glass tips.
- Light weight, rugged pump. Lip seal gasket design provides an optimum pump vacuum.
- Counter: Allows the user to keep track of multiple strokes (pump volume).
- Guide mark.
- Strong handle for a secure grip.

GAS ANALYSER FOR CHECKING ETHYLENE & CO2 LEVELS

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