Electro-Magnetic Compatibility (EMC)

This product complies with Council Directive 89/336/EEC when installed and used in accordance with the relevant instructions.

Service and Technical Support
PLEASE CONTACT YOUR NEAREST DISTRIBUTOR
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Our policy is one of continuous improvement and the information in this document is subject to change without notice. Check the software reference matches that displayed by the instrument.

Document number
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User Guide

AIRTEC Quality Controller

Calibration and Operation

Software Ref: NG 322-5

Contents

Function

The Airtec Quality Controller is an air pressure control system for use with Airtec kits on sprayers, where the application rate is controlled by an existing liquid regulation system.

It works by maintaining the correct pressure differential between the air pressure and the liquid pressure, in order to achieve the desired spray quality.

The system enables both fully automatic and manual control of air pressure.

(i) In automatic mode, the desired spray quality is preset – very fine, fine, medium or coarse. The system will continuously regulate air pressure and maintain the spray quality.

(ii) In manual mode the operator sets the desired air pressure. The instrument will then continuously monitor and display the spray quality achieved.

When fitted with the appropriate sensor, the system can also monitor and display shaft (fan) speed or wind speed. The instrument can be programmed to alarm if an averaged shaft or wind speed is exceeded (alarm functions are inhibited when the sprayer is switched off).

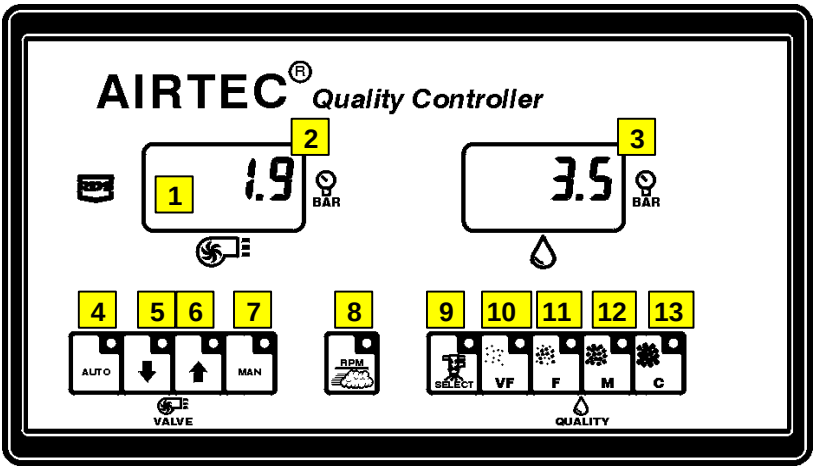
The instrument is powered on via the ignition switch and displays the function selected when it was last used. The head unit interfaces with the existing rate control system so that the air and liquid flow are switched on and off together, via the sprayer control box.

Calibration

Calibration is normally only required when the system is first installed. The instrument has a separate calibration mode. This is not accessible during normal operation. A printed card is provided which when placed over the front panel, identifies the switch functions when the instrument is in the calibration mode.

The system is pre-programmed for Airtec restrictors 28, 35, 40 and 50. It is also programmable for any new type of nozzle that may be developed.

2.1 Operating functions



1. Back lit display
   Air pressure display (0.1 bar),
2. Shaft speed or wind speed
   Nozzle type
3. Liquid pressure display (0.1 bar)

Pressure controls:

4. Select Automatic control
5. Reduce air pressure (MAN mode only)
6. Increase air pressure (MAN mode only)
7. Select MANUAL control
8. Display shaft speed / wind speed

Spray quality controls:

9. Display nozzle type
10. Set spray quality: Very fine
11. " Fine
12. " Medium
13. " Coarse

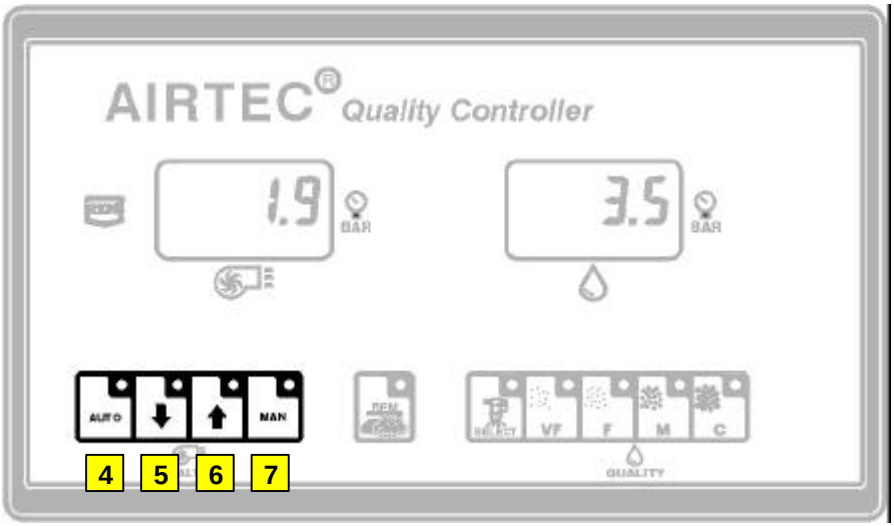
An LED above each key indicates when that function is selected.

2.2 Switching on

The instrument should power up when the ignition is switched on. It will perform a full display test, show the software issue number and then be in operating mode.

The nozzle selection, quality setting and displayed function will be remembered from the previous operating session.

2.3 Air pressure control



AUTOMATIC Air Pressure Control

Press the 

key to select AUTOMATIC mode.

When the sprayer is switched on via the sprayer control box, the air pressure will be regulated automatically according to the liquid pressure, so as to maintain the pre-selected spray quality.

The  and  keys have no function in automatic mode.

MANUAL Air Pressure Control

Press the 

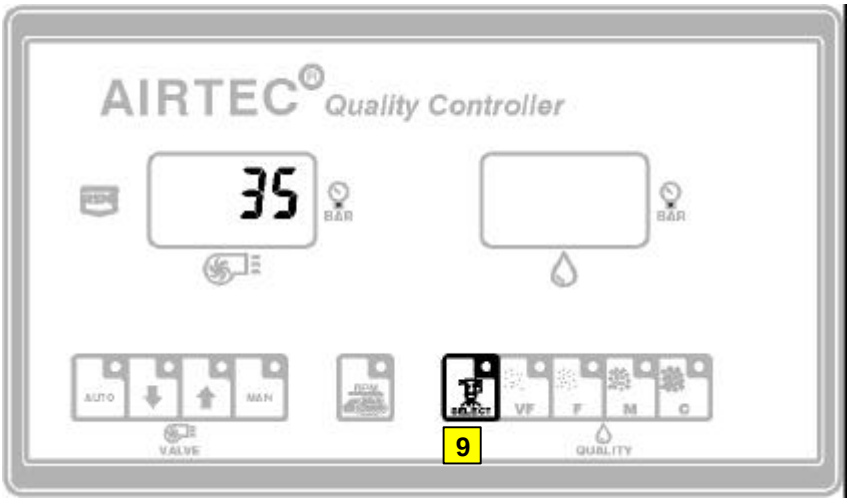
key to select MANUAL mode.

Press and hold the  key to decrease the air pressure.

Press and hold the  key to increase the air pressure.

The LED's above the spray quality keys will light to indicate the spray quality being manually achieved.

2.4 Nozzle type

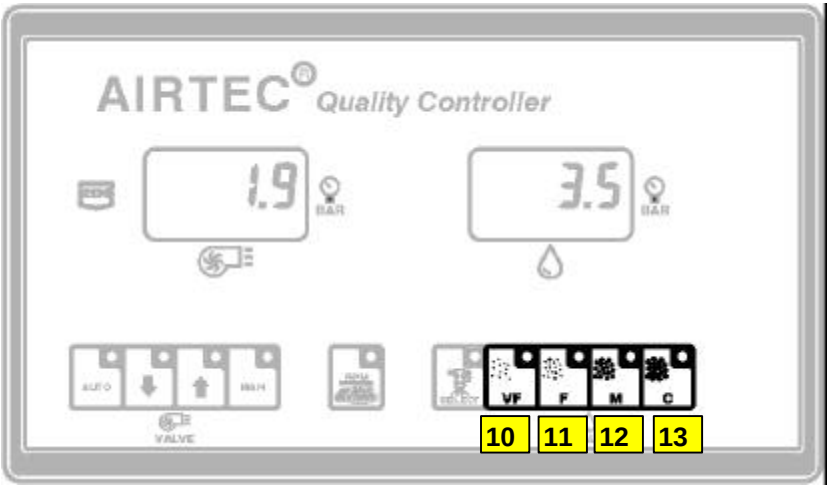


Press the  key to display the type of nozzle selected (set in calibration mode).

The left hand display will show **'h'** for ordinary hydraulic nozzles **or '28', '35', '40' or '50'** for Airtec nozzles. If 'h' is selected, then the air pressure stays at zero and the air pressure controls have no function.

If Airtec nozzles 28, 35, 40 or 50 are selected, then the air pressure is regulated.

2.5 Spray Quality



Spray quality in AUTOMATIC mode

Spray quality is only selectable in AUTO mode. When the key is pressed the LED will come on. The air pressure is then controlled to produce the desired spray quality.

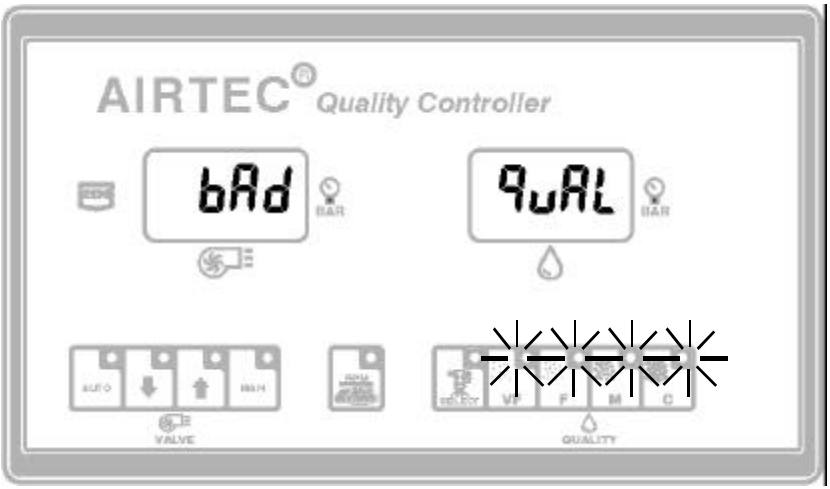
Very **F**ine spray

Fine spray

Medium spray

Coarse spray

Spray Quality Alarm condition



The “VF”, “F”, “M” and “C” Quality switch LED’s also flash.

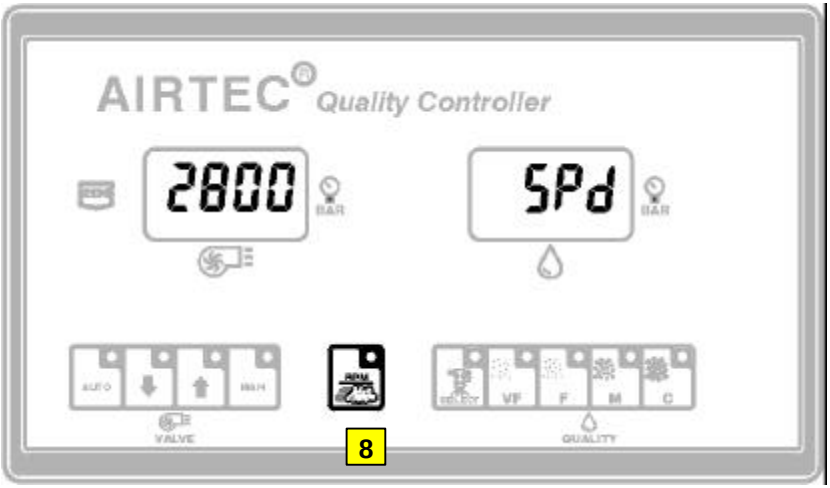
If the liquid pressure is such that the appropriate air pressure cannot be achieved, then all four LEDs will flash and the displays will flash '**bad**' '**qual**' once every five seconds. The audible alarm will beep once every five seconds.

This alarm function is enabled only when the sprayer is operating.

Spray quality In MANUAL mode

If manual control is selected, then the LEDs will come on for the particular spray quality being achieved at the manually set pressure.

2.6 Shaft speed / wind speed



Displaying Shaft speed / wind speed

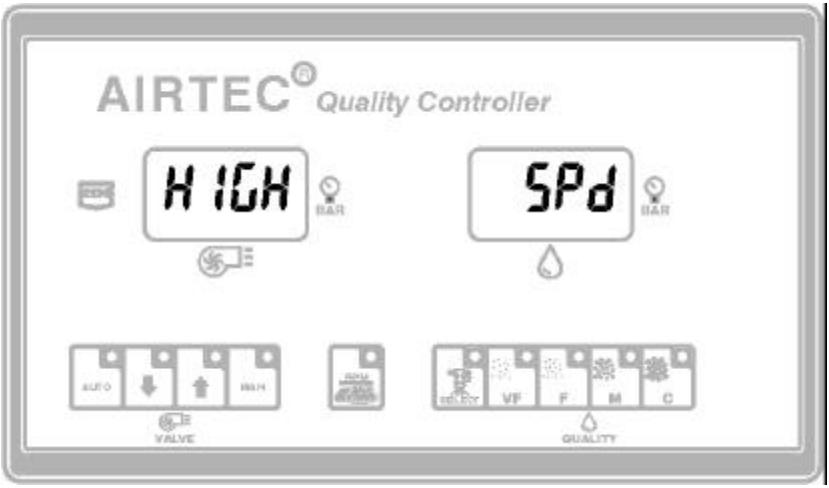
Press the RPM key to display the RPM or wind speed on the left hand display.

The right hand display will show '**Spd**'. The displays will default to pressure after 30 seconds, or when the switch is pressed again to deselect the speed display.

The display resolution is set automatically as follows;

Number displayed	*Resolution*
1000 or greater	100 (e.g. 2800, 2900, 3000 etc)
100 to 999	10
10 to 99	1
less than 10	0.1

Shaft / Wind Speed Alarm condition

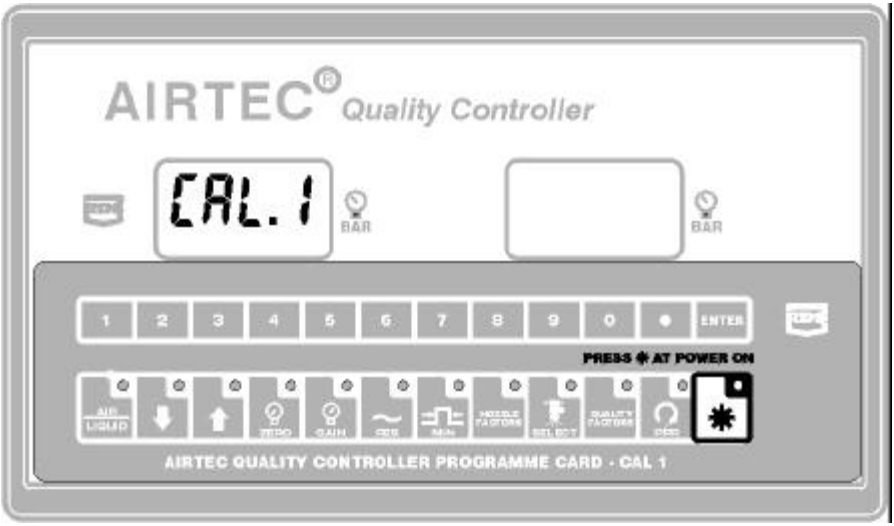


When the speed averaged over 10 seconds exceeds the alarm level, the displays will flash '**HIGH**' '**SPd**'.

This alarm function is enabled only when the sprayer is operating.

The alarm level is set in calibration mode.

3.1 Enter / Exit Cal mode



Enter CAL mode

Place the printed CAL card over the front panel to identify the functions in CAL mode.

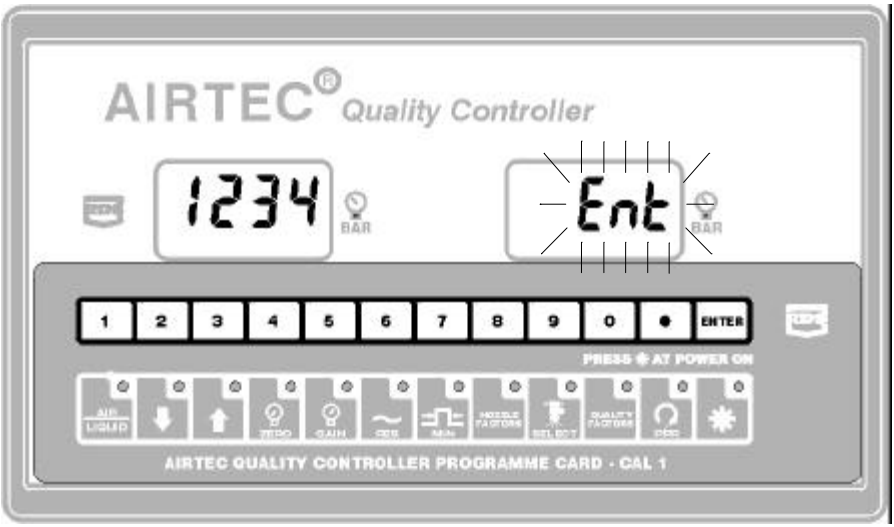
Press and hold the ✱ key and power on the instrument.

The key functions are then re-defined. The left-hand display will show '**CAL 1**' until one of the lower keys is pressed. It will then show the currently programmed value for whichever of the lower keys is pressed.

Exit CAL mode

Either switch the power off and back on again, or press and hold the ✱ key for more than 4 seconds (until the display reverts to operating mode).

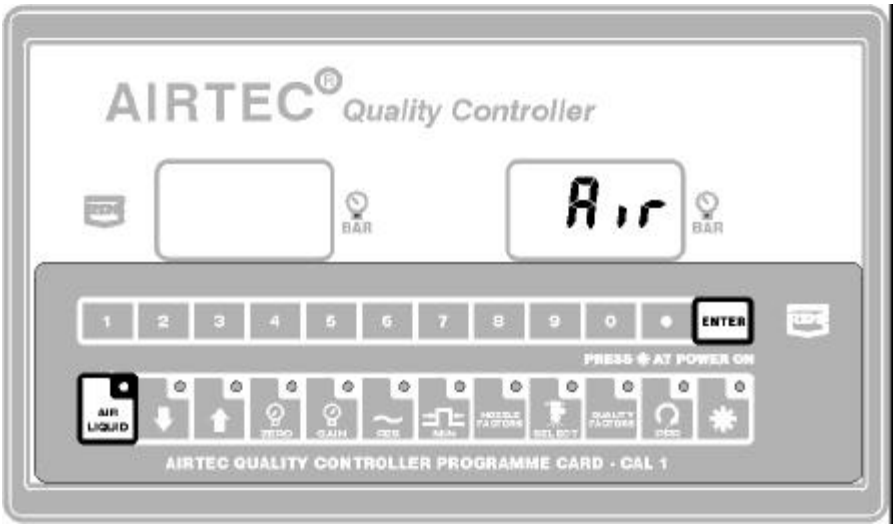
Data Entry



A new value is set using the top row of numeric keys. Each keystroke is confirmed with an audible beep. The left-hand display will flash after the first digit to indicate that new data is being set. The right hand display flashes '**Ent**'

Press the ENTER key to confirm the new value.

3.2 Select sensor for calibration

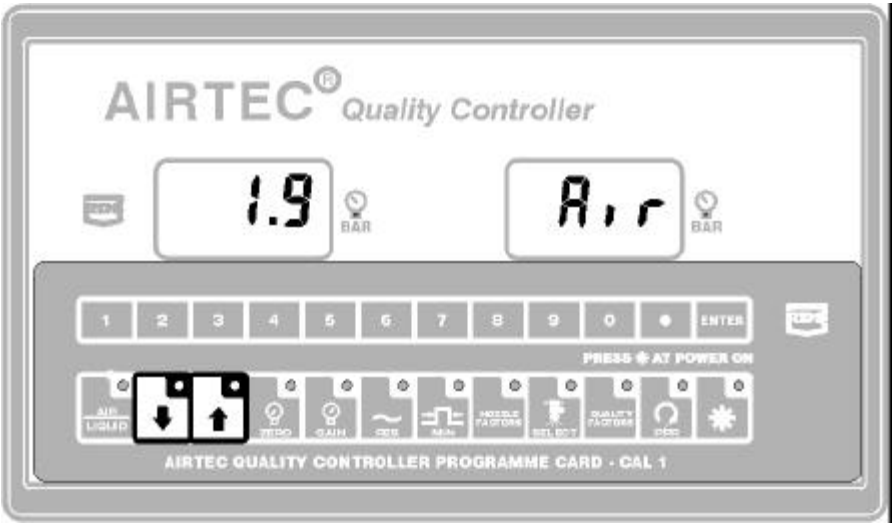


The 'Pressure Zero', 'Pressure Gain' and 'System Response' parameters must be set for both the liquid control system and the air control system. 'Pressure Zero' and 'Pressure Gain' are used to calibrate the pressure sensor to the instrument.

Press the AIR LIQUID key.

The right hand display will show '**Air**' or '**Liq**' to indicate the control system being set up.
Go through the following procedure and set each parameter for liquid. Then press and hold the key to select '**Air**'. You can then set each parameter for the air control system.

Adjust air pressure

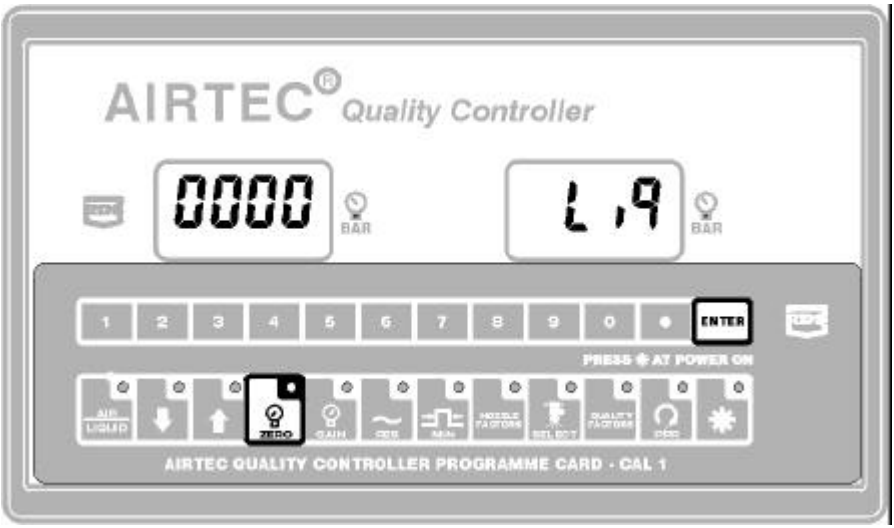


The  and  keys have the same function as in the operating mode.

They are used to set the air pressure when setting the 'Pressure Zero' and 'Pressure Gain' parameters.

These keys have no function when the instrument is set for liquid - '**Liq**'.

3.3 Pressure Zero



“Pressure Zero” function for both Air and Liquid sensors

The 'Pressure zero' function calibrates the zero point for the liquid and air sensors.

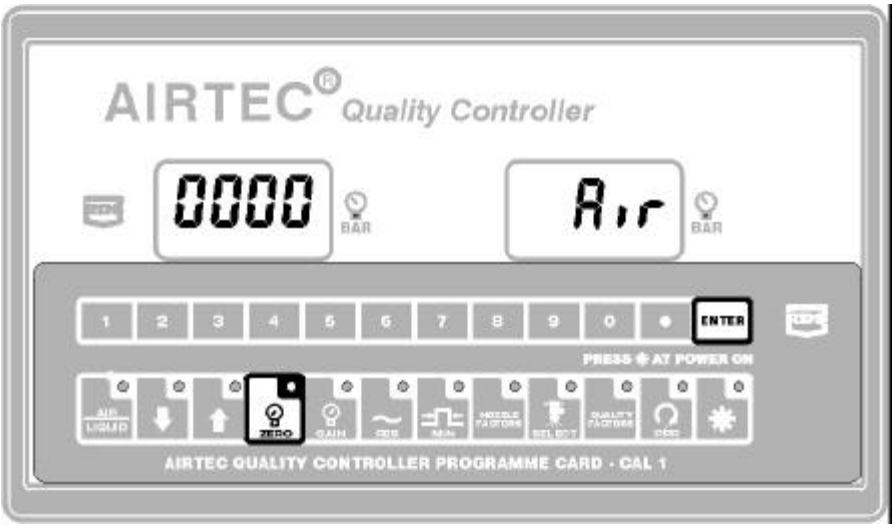
Zeroing the liquid pressure

Select the liquid sensor for calibration.

The left-hand display will flash '**0000**' and the right hand display will show '**Liq**'.

Ensuring that the sensor is at zero pressure, press the ENTER key to confirm the zero pressure voltage for the liquid sensor.

Zeroing the air pressure

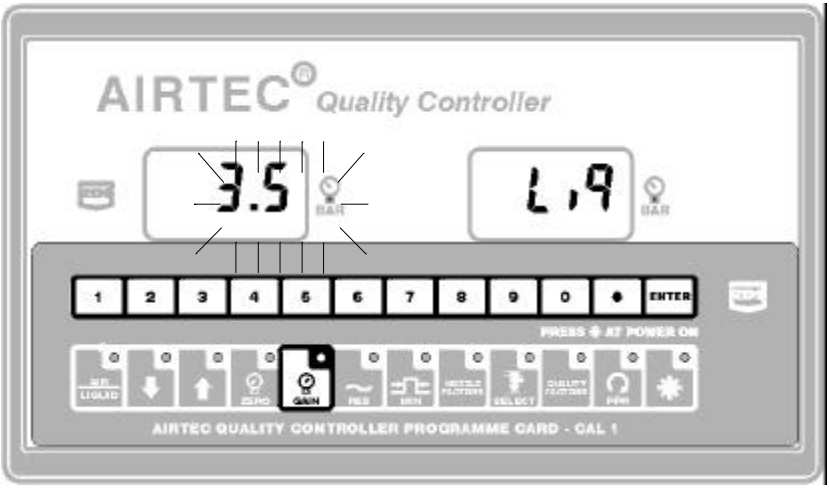


Select the air sensor for calibration.

The left-hand display will flash '**0000**' and the right hand display will show '**Air**'.

Ensuring that the sensor is at zero pressure, press the ENTER key to confirm the zero pressure voltage for the air sensor.

3.4 Pressure Gain



The 'Pressure Gain' function calibrates the air and liquid pressure sensors at a typical spraying pressure. For maximum accuracy it is recommended to set pressures against reference gauges temporarily installed on the boom line.

Calibrating “Pressure Gain” for the Liquid sensor

Select the liquid sensor for calibration.

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To set the pressure sensor gain the sprayer pump must be running.

When the engine is started the instrument may revert to normal operating mode. If so turn the ignition off (leaving the engine running) and re-enter the CAL mode. Start the sprayer pump running and set the spray pressure on the pressure gauge to a typical spraying pressure, using the existing liquid rate controller.

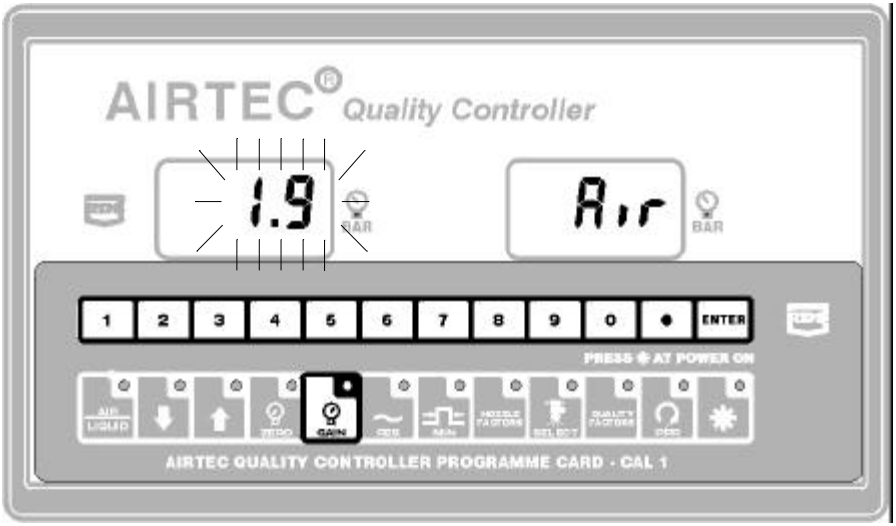
Press the 

key.

The left-hand display will show a liquid pressure reading, which may or may not correspond to the pressure indicated on the reference gauge.

Key-in the actual reading from the pressure gauge and press the ENTER key to confirm.

Calibrating “Pressure Gain” for the Air sensor

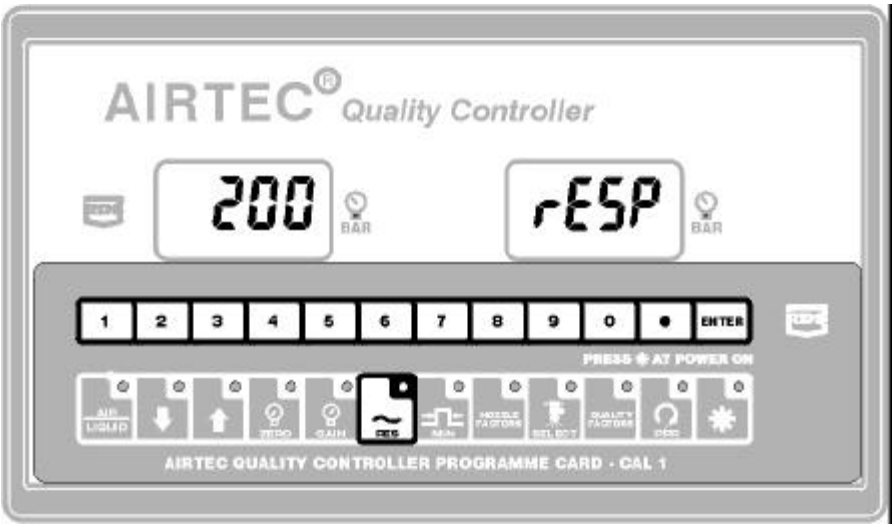


Select the air sensor for calibration.

Set the air pressure to a suitable level. The left-hand display will show an air pressure reading, which may or may not correspond to the pressure indicated on the reference gauge.

Key-in the actual reading from the pressure gauge and press the ENTER key to confirm.

3.5 System Response



The 'System Response' function relates to the automatic control performance of the air regulating valve. It can be set to any number between 0.001 and 9999.

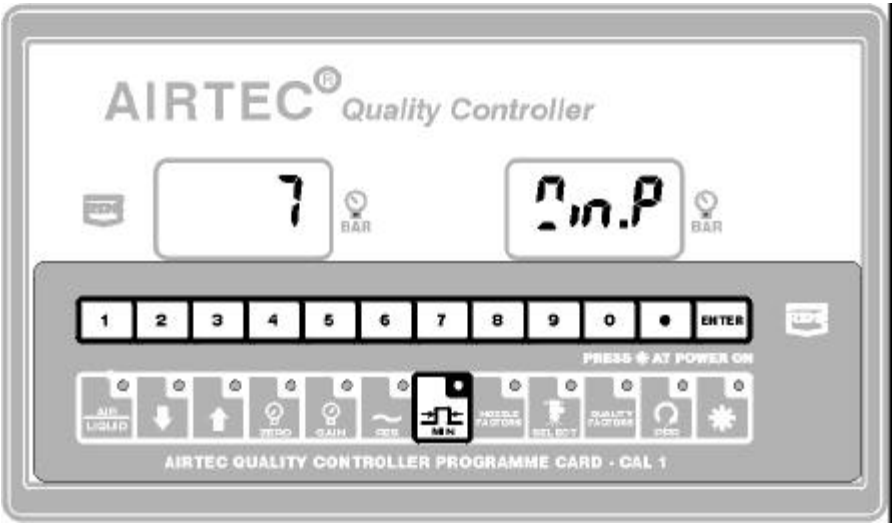
Default setting = 200

Setting the System Response

If the System Response is set to too small a number it will make the regulating valve movements small and automatic control will be sluggish. A large number will make the valve move in large steps. This may make the automatic control overshoot and be unstable. Either condition will adversely affect the ability of the system to maintain the desired spray quality.

Key-in and enter a new value if required.

3.6 Minimum Pulse



The 'Minimum Pulse' function also relates to the automatic control performance of the air regulating valve. It can be set to any number between 1 and 128.

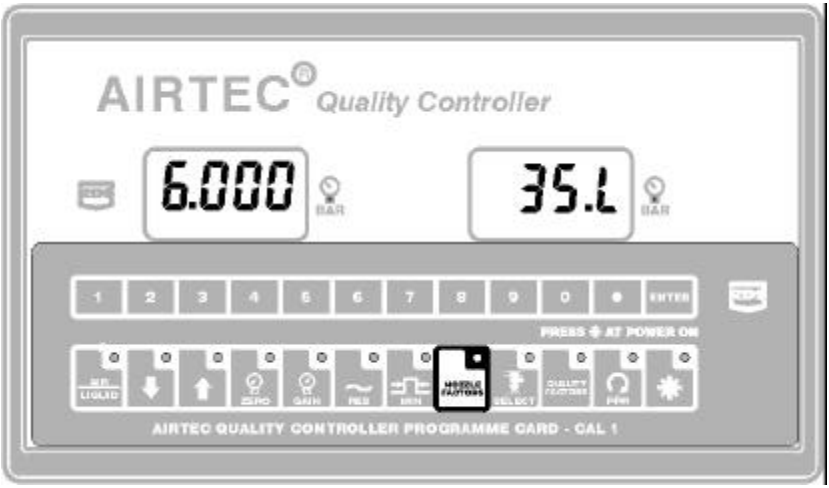
Default setting = 7

Setting the Minimum Pulse

The pulse driving the regulating valve will become shorter in length as the air-liquid pressure differential comes closer to that which gives the desired spray quality. a smaller number gives a shorter pulse length. If the pulse length is too short the system may be unable to vary the air pressure as liquid pressure varies.

Key-in and enter a new value if required.

3.6 Nozzle factors



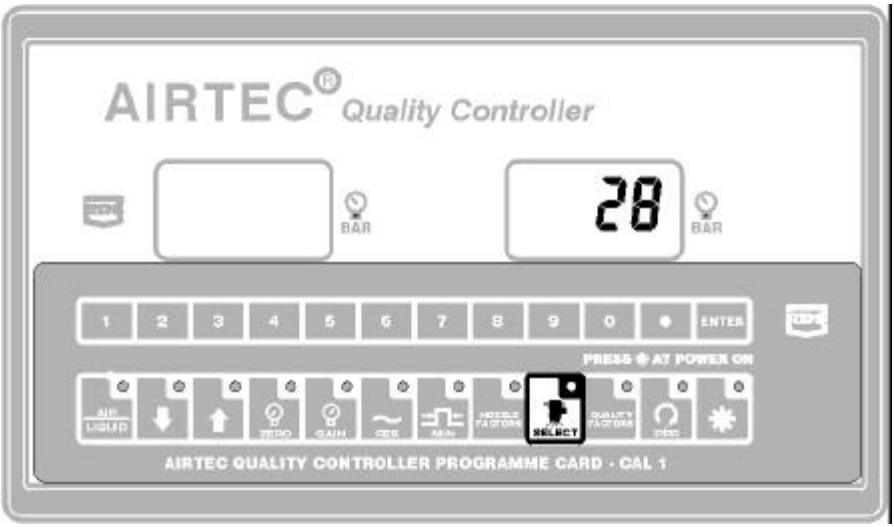
Calibration data for Airtec nozzle types 28, 35, 40 and 50 is pre-programmed in the instrument. There are however 3 factors available to alter the nozzle performance.

Factor 'L' Liquid factor
Factor 'A' Air Factor
Factor 'Q' Quality factor

The entire performance of the Airtec system is dependent on these factors. They should not be altered unless recommended by Cleanacres. The pre-programmed factors are;

Restrictor size	**28**	**35**	**40**	**50**
Liquid factor	6.000	6.000	3.500	1.321
Air factor	2.000	1.932	1.032	0.277
Quality Factor:				
Very Fine	0.800	1.100	1.200	1.500
Fine	0.400	0.800	0.860	1.200
Medium	0.200	0.500	0.520	0.980
Coarse	0.000	0.220	0.240	0.400

Selecting a nozzle

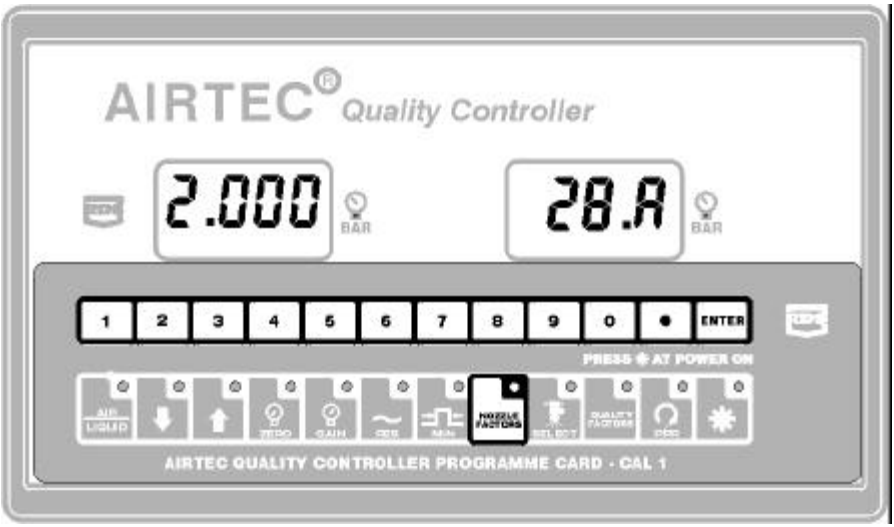


If nozzle characteristics change then the factors are adjusted as follows;

1. Press the SELECT key to select the nozzle type 28, 35, 40 or 50 for which the factors are to be set.

   The RH display will show the restrictor number e.g. '**35**'.

Selecting and changing an Air or Liquid Factor

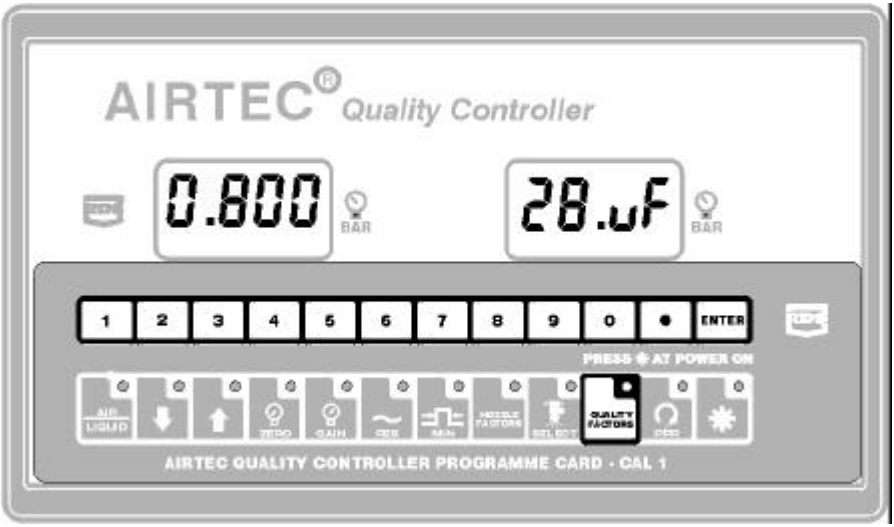


1. Press the NOZZLE FACTORS key to select either Air or Liquid factor.

   The right-hand display shows the restrictor number and parameter e.g. '35.L'. The left-hand display shows the Air / Liquid Factor currently programmed.

2. Key-in the new factor and press the ENTER key to confirm.

Selecting and changing a Quality Factor



1. Press the SELECT key to select the nozzle type 28, 35, 40 or 50 for which the factors are to be set.

   The RH display will show the restrictor number e.g. '**35**'.

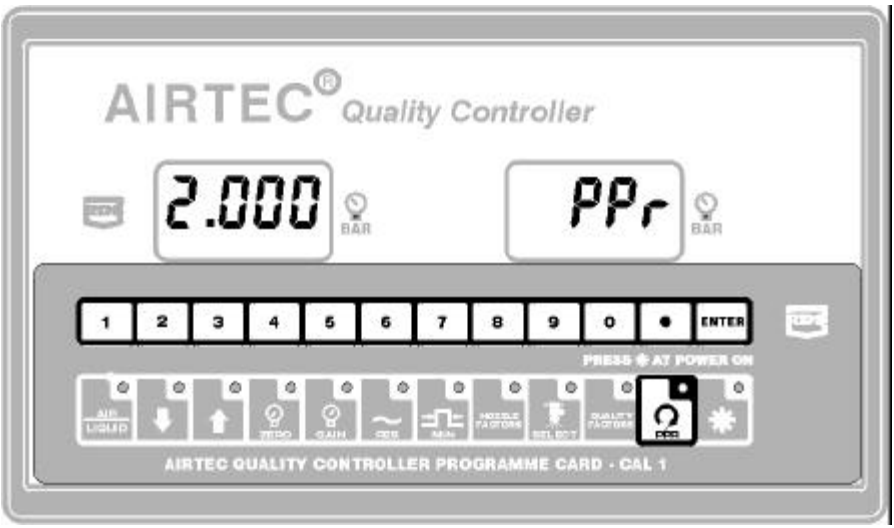
2. Press the QUALITY FACTORS key to select the Quality Factor to be set.

   The RH display shows the restrictor number and parameter e.g. **'35.vF'** = Restrictor 35 - Very Fine Quality. The LH display shows the Quality Factor currently programmed.

3. Key-in the new factor and press the ENTER key to confirm.

3.8 Shaft Speed/ Anemometer Calibration

3.8.1 Primary data - Pulses per rev



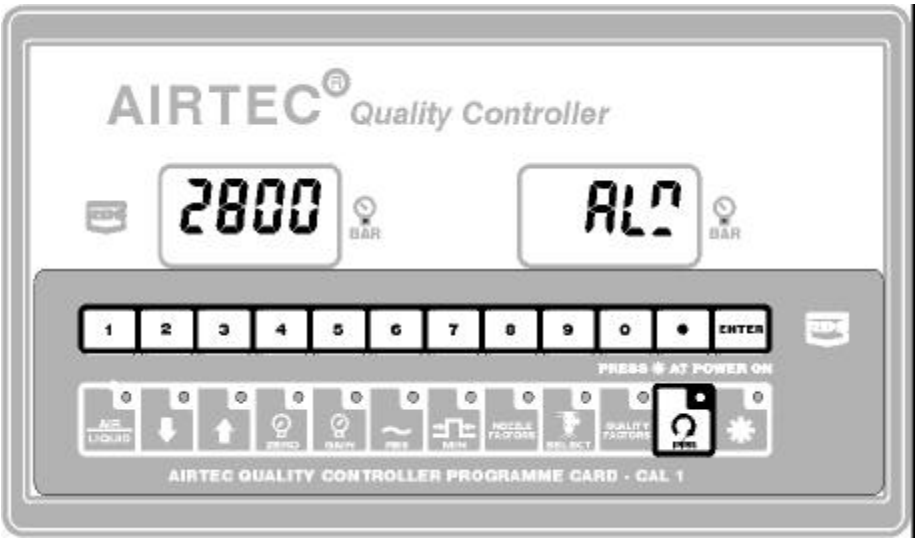
Press the PPR key once to select pulses per revolution of the sensor. The right-hand display shows '**PPr**' . The left-hand display shows the number of pulses per revolution currently programmed.

The calibration factor must be determined by experiment. With the instrument in normal operating mode and set to display speed, by suitable means establish the actual speed input (e.g. using a hand held tachometer to measure shaft speed).
Note the speed reading on the instrument. If the instrument reading differs from the measured speed calculate the factor correction as follows;

$$\text{New factor} = \text{current factor} \times \frac{\text{instrument reading}}{\text{measured speed}}$$

Key-in the new factor and press ENTER to confirm.

3.8.2 Secondary data - Alarm speed



The secondary data is the Shaft speed / Wind speed threshold at which the instrument will alarm.

Press the 

key a second time once to select the alarm speed.

The right-hand display shows '**ALM**'. The left-hand display shows the alarm speed in rpm or m/sec as appropriate.

Key-in the value and press ENTER to confirm.

This concludes calibration. Switch the power off and on again to go into normal operating mode.

Document history:

Issue	Date issued	Changes
1	18/9/99	Original issue
2	10/2/00	pages 3, 9, 11 : Alarms inhibited when sprayer is switched off