

# SELECT Livestock

Dosing System



Cambridge  
Agricultural

# Instructions for Use

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**DS**  
DOSING  
SOLUTIONS

### Description

The Select Livestock dosing system is designed to accurately dose product to livestock (principally cattle and sheep) on a ml per head basis over a full 24 hour period. A unique system of automatic re-calculation and application of dosing ratios on a daily basis ensures that seasonal variations of water consumption are taken into account without the need for manual re-adjustment of the equipment.

### Changing Pump Tubes

ENSURE EITHER THE POWER SUPPLY OR FLOW SENSOR LINE IS DISCONNECTED BEFORE  
CHANGING THE PUMP TUBE.  
OTHERWISE ROTOR TURNING IS POSSIBLE

Removal of pump tube - Open the clear Perspex pump head cover. Unclip the pump tube at the inlet. Lift out the pump tube whilst rotating the pump rotor by hand in a clockwise direction. When the pump tube is clear of the rotors, unclip the pump tube at the outlet.

Installing new pump tube – clip the pump tube into the white retaining clip near to the inlet position leaving approx 5mm (1/4 inch) clear of the clip. Whilst turning the pump rotor by hand in a clockwise direction, feed in the pump tube between the rotors and the pump housing. Finally clip the free end of the pump tube into the white clip at the outlet position. Close clear Perspex cover before use.

Ensure that all connectors between the pump tube and delivery tubes are securely fitted. If necessary warm the delivery tube with warm air or water to soften it to make fitting more easy.

### Pump Tube Life

The life of the pump tube will depend on many factors including the product being dosed, the back pressures under which the pump is working, and the amount of time the pump needs to run to perform correctly. It is suggested that, in order to maintain dosing accuracy, the pump tube is replaced on a MONTHLY BASIS or sooner if wear or disfiguration of the tube is apparent. Spare tubes are available from your pump supplier. Note: Only tubes supplied by Cambridge Agricultural are recommended for use in the Select dosing system to ensure accuracy of operation.

### Safety

The Select doser is an extremely safe unit. However, the following points should be observed:

Normal electrical safety precautions apply. Avoid water contact with any pump parts apart from the pump tube in normal working. Do not immerse the Select doser.

Take precautions to ensure the Select doser can not fall into the stock solution. Consider extra tethering if necessary. Cover stock solution at all times. If immersion does happen accidentally, isolate the Select Doser from the electrical supply immediately.

The use of safety circuit breakers is recommended. If in doubt seek advice from a qualified electrician.

### Accuracy

The Select doser is factory set to give accurate dosing. If, during normal operation, the output needs to be increased or decreased slightly, this can be achieved via the screen command "Adjust %".

### Electrical Supply

The Select doser uses a 12V DC power supply. This can either be supplied from a 12V battery or via a transformer power supply from the mains electricity supply.

A 1.0 – 1.5A maximum current power supply is recommended. The Select doser normally runs below 500mA although starting currents are larger and dependant on the pumping conditions encountered.

### The Water Flow Sensor

The water flow sensor (VTH25) records water flow from 200 litres/hour to 10,000 litres/hour. Over 67 electrical pulses are sent from the sensor to the Select doser per litre of water flow. This sensor will withstand pressures up to 6 Bar. Ensure that the flow sensor is installed in the water line up-stream of the point at which the Select doser injects the additive into the drinking line. Water flow should be in the direction of the arrow on the sensor.

Several flow sensors can be pre-installed in different drinking lines along with connection points for the additive delivery tube. Lines can then be individually medicated.

### The Programme Options

Several options can be pre-allocated in the Select doser when it is supplied new, or can be set by Distributors. The **High Flow Register** can be set to:

- EITHER continue to dose when a larger than expected flow of water is encountered that the doser is unable to keep pace with (possibly on a hot day for example). In this case a warning message will be displayed on-screen to indicate a water flow problem has been encountered.
- OR Stop dosing if a high water flow is encountered and display a warning sign on-screen (for instance if a pig has kicked a water line or some other water pipe fracture has occurred). If this option is chosen the doser will not continue to dose product which would then be wasted. The doser is stopped with a warning message displayed on-screen.

The **Restart Register** can be pre-set to:

EITHER return to the welcome screen in the event of electrical power being lost and then resumed.

This would be a useful option if electrical current disturbance is relatively infrequent and all equipment on a farm would need to be checked and re-set in the event of a power failure.

OR Re-commence doser operation from exactly the point at which the power was lost. This could mean returning to the Meter Only screen (see below for details), or return to the dosing screen and normal dosing operation that was in progress when the power was lost.

Not all options may be available on your doser. For upgrades – please contact your Distributor.

When the electric supply is first connected, the version of the programming will be shown.

1	<p>This is the <b>Welcome Screen</b>          To see the options available press "Set" (Options)          To start dosing immediately if no changes are required, press "Adjust" (Start). See Screen 14 below for further instructions.</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Select Livestock</p> <p>Start      Options</p> </div>
2	<p>If the "Options" button is pressed, the first option is to enter the number of livestock units to be dosed (see below for definitions)</p> <p>Press Adjust to enter the Livestock units</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Doser options</p> <p>Stock units</p> </div>
3	<p>The change each digit in turn, with the cursor under the first digit press Adjust repeatedly until the correct digit is shown, then press Set to move to the next digit.</p> <p>For less than 1000 Livestock Units, ensure the first digits are zeros e.g. 0576 for 576 Livestock Units.</p> <p>Press Set after the final digit is chosen. The following screen will be shown:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Stock Units?</p> <p><u>1</u>100</p> </div>
4	<p>Press Adjust to re-enter Livestock Units, or Set to move to the next Option.</p> <p>Pressing Set will show:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Doser options</p> <p>Stock units</p> </div>
5	<p>The dose per head is the amount to be dosed per Livestock Unit. Pressing Set will move to the next option.</p> <p>Press Adjust to enter the dose per head. The following screen will be shown:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Doser options</p> <p>Dose per head</p> </div>

6	<p>There are 15 choices of dose per head (normally ml per head) programmed into the doser. Press Adjust repeatedly until the correct dose per head is shown, then press Set to accept this choice. If the required dose per head is not listed, please contact your Distributor.</p> <p>The following screen is shown after pressing Set:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Dose per head?</p> <p>3.00</p> </div>
7	<p>In normal working the Livestock doser will record yesterday's water total and use that figure to accurately dose the required amount of product over the full 24 hours today. On initial set-up, there will not be an accurate value stored for yesterday's water total, so an estimate can be entered.</p> <p>Press Adjust to enter a value for yesterday's water total. The following screen is shown:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Doser Options</p> <p>Total Yesterday</p> </div>
8	<p>If the total is left as 0000, the Livestock doser will not dose during the first 24 hours, but the water flow will be recorded and the doser will commence dosing at the end of the first 24 hours using the correct value of water total (see Screen 21)</p> <p>If it is possible to enter an estimation of yesterdays water total (e.g. 10% of the bodyweight of the stock being dosed), adjust each digit when it has the cursor under it by pressing the Adjust button repeatedly. Press set when each digit is correct.</p> <p><b>NOTE:</b> The units are in 100 litres. So a water total of 50,000 litres is shown as 0500 (ensure the initial digit is a zero)</p> <p>When Set is pressed after the final digit is selected the following screen is shown:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Total Yesterday?</p> <p><u>0</u>000</p> </div>
9	<p>To re-enter yesterday's water total press Adjust. Otherwise press Set to show the following screen:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Doser Options</p> <p>Total Yesterday</p> </div>
10	<p>If no changes are required to be made to the sensor number press Set. To enter or change the sensor number press Adjust to show the following screen:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Doser Options</p> <p>Select Sensor</p> </div>
11	<p>The flow sensors supplied with the Livestock doser have a tag on the connection plug showing the number of the sensor. To change the sensor number, press Adjust repeatedly to show the correct number, then press Set to show the following screen:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Sensor Type?</p> <p>3</p> </div>
12	<p>If the Livestock is fitted with an alarm system to indicate that a pump tube has burst, the alarm system can be enabled by pressing Adjust to change the N (no) to Y (yes). If this alarm system is not required or not fitted, N has to be shown. Then press Set to show the following screen:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Doser Options</p> <p>Tube Burst En. N</p> </div>

13	<p>Options are now complete. This is the Welcome Screen. To make further changes to the Options, press Set.</p> <p>To start dosing press Adjust and the following screen will be shown:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Select Livestock</p> <p>Start      Options</p> </div>
14	<p>The Blue pump tube needs to be fitted. See the section above – Changing Pump Tubes.</p> <p>Press Set to see the following screen:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Use Blue tube</p> </div>
15	<p>To take account of inaccuracies in the extrusion of the pump tube, we recommend that a digital adjustment is made to correct the accuracy of the Livestock doser. The Adjust % is shown on the packet containing the pump tube as supplied with the doser. Press Adjust repeatedly to show the correct Adjust %. (Note – The digits will scroll 0 to +20 to -20 to 0 again.</p> <p>When the correct Adjust % is shown press Set to show the following screen:</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Adjust %</p> <p>+6</p> </div>
16	<p>In order to fill up the delivery tube with the product to be dosed, press Set (Yes). The pump will run constantly to fill the delivery tube. Press No if tube filling is not required.</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Prime pump?</p> <p>No                  Yes</p> </div>
17	<p>This screen will be shown while the pump is running to fill the delivery tube. Press Stop once the tube is full up to the injection assembly.</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Priming</p> <p>Stop</p> </div>
18	<p>This is the dosing screen shown during the normal operation of the Livestock doser. The screen will change every 5 seconds to reveal more information. This is the screen shown during the first 5 seconds.</p> <p>The doser is dosing at a ratio of 1:15151  The Blue tube is fitted with an Adjust % of +6%  The total water used in the present 24 hour period is 6700 litres - (0067T)  The water flow at the present time is 8,900 litres per hour (89H) - (changes each 5 seconds)</p> <p>At the start of the next 24 hour period (when 23.59/24 changes to 0.00/24) a new dosing ratio will automatically be adopted to reflect a new 24 hour water record.</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>R15151    Blu +6%</p> <p>0067T                  89H</p> </div>
19	<p>This is the screen shown during the following 5 second period.</p> <p>The total water used yesterday was 50,000 litres (0500Y)  1100 Livestock Units are being dosed (C is the number of stock)  The dose per Livestock Unit is 3.00ml  We are 1 hour and 29 minutes into the present 24 hour period</p> <p>At the start of the next 24 hour period (when 23.59/24 changes to 0.00/24) a new dosing ratio will automatically be adopted to reflect a new 24 hour water record.</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>0500Y                  1100(C)</p> <p>3.00ml                  1.29/24</p> </div>

20	If yesterday's water total was zero, the dosing screen will show these details. This is the first screen showing 0000Y as yesterday had a zero total. The doser will not be dosing, but water data is being collected.	<table border="1"> <tr> <td>0000Y</td> <td>1100(C)</td> </tr> <tr> <td>3.00ml</td> <td>3.24/24</td> </tr> </table>	0000Y	1100(C)	3.00ml	3.24/24
0000Y	1100(C)					
3.00ml	3.24/24					
21	The following 5 seconds this screen will be shown. R0 is shown as no dosing ratio is available until 24 hours of water data has been collected. Data is shown as data is being collected on water consumption during the present 24 hour period (we are only 3 hours and 24 minutes through the present 24 hour period).	<table border="1"> <tr> <td>R0</td> <td>Blu +6%</td> </tr> <tr> <td>0059T</td> <td>Data 21H</td> </tr> </table>	R0	Blu +6%	0059T	Data 21H
R0	Blu +6%					
0059T	Data 21H					
22	If, during normal dosing, the Livestock Doser recognises that dosing has been completed before the end of a 24 hour period due to water consumption being higher than yesterday, the doser will stop operating to avoid over-dosing. For the remainder of the 24 hour period this screen will be shown (dosing is Done), water data will continue to be collected until the end of the 24 hour period.	<table border="1"> <tr> <td>R15115</td> <td>Blu +6%</td> </tr> <tr> <td>0128T</td> <td>Done 32H</td> </tr> </table>	R15115	Blu +6%	0128T	Done 32H
R15115	Blu +6%					
0128T	Done 32H					
23	Pressing and holding the Adjust button for 0.5 secs will return to the Welcome Screen.	<table border="1"> <tr> <td colspan="2">Select Livestock</td> </tr> <tr> <td>Start</td> <td>Options</td> </tr> </table>	Select Livestock		Start	Options
Select Livestock						
Start	Options					

To make any adjustments to settings, return to the Welcome Screen and progress through the options. To return to the Welcome Screen, press and hold **Adjust** from the Operational Screen.

On the Operational Screen, the following colour abbreviations are used:

Red	Red
Green	Grn
Blue	Blu
Black	Blk

#### Definitions

**Livestock unit** – This is defined by the dosing rate of the product being dosed. If the dosed product recommends 2.5ml per 500kg and there are 1,000 x 500kg cattle, the Livestock Units = 1,000. If there are 1000 x 660kg cattle, the number of Livestock Units is  $1000 \times 660/500 = 1320$ .

#### Water Meter Total

Note: the maximum quantity of water that is shown on the water total quantity is 1,000,000 litres. After this the meter will return to zero, and water metering will re-commence as normal. This is the maximum daily total as the meter is automatically returned to zero at the start of each 24 hour period.

#### Water Flows and Totals

The instantaneous water flow is shown on-screen in units of 100 litres per hour. E.g. 76H is 7,600 litres per hour.

The cumulative daily water total is shown in units of 100 litres. E.g. 0029T is a water total of 2,900 litres.

#### Flow Sensor Capacities

There is a maximum limit on the flow of water permissible through each flow sensor. The maximum flows are:

VTH 25	10,000 l/hr
VTH 40	25,000 l/hr

### The Dosing Function

The Livestock doser will operate as a proportional dosing pump every 5 seconds. The internally and automatically calculated dosing ratio ensures that exactly the correct amount of product is dosed over a full 24 hour period. The dosing will vary each 5 seconds depending on the amount of water consumed during any specific 5 second period.

If water consumption is higher on Day 2 compared with Day 1, dosing will be completed shortly before the end of the 24 hour dosing period – hence product is not wasted.

If water consumption is lower on Day 2 compared with Day 1, the doser will still be operating at the end of the 24 hour dosing period and there will be a slight under-dosing on Day 2. This will be automatically corrected on Day 3 as the new, lower Day 2 water total will be used in the calculation of the dosing ratio for Day 3.

Seasonal variations in water consumption per head of livestock are therefore automatically compensated for.

### Maximum Water Flows for Each Dosing Ratio

If the Select doser is turning for almost the full 5 seconds of each 5 second dosing period, this is the maximum output of the pump. For each colour pump tube there will be a maximum water flow that can be dosed based on the maximum output of the pump. A table of maximum (approx) water flows for each pump tube colour and each ratio is shown below. If this water flow is exceeded then “High Flow” will be shown on-screen.

Note: The actual maximum water flow allowable will be the lower value from the chart below or the sensor flow capacity shown above (Flow Sensor Capacities).

Note: The Blue pump tube will normally be requested on the Livestock doser

### Alarms and Warnings

If a high water situation is detected where the doser is unable to keep pace, the doser will either continue to dose and display “High Water” on-screen (If the High Flow Register is set to Continue to Dose), or a warning will be shown on-screen and the doser will stop operation (If the High Flow Register is set to Stop Dosing).

If for some reason the rotor becomes jammed or there is a mechanical fault within the pump drive system a warning – “Pump Error” may appear on-screen. If the fault is not immediately apparent and rectifiable, PLEASE CONTACT YOUR DISTRIBUTOR.

### Water Line Pressure

The Select doser will operate against a water pressure in the drinking line of up to 2 bar. (2 bar = 28psi = 66ft H<sub>2</sub>O = 20.4m H<sub>2</sub>O). It may be possible to dose into slightly higher water line pressure of 3 – 4 bar with the blue and black pump tubes. Fit a pressure reduction device if necessary. The flow sensor is rated to 6 bar.

### Constant Pumping

If the priming option is selected from the menu on the control screen (see above) the pump rotor will turn continuously regardless of the flow in the drinking line. This can be useful for filling the suction and delivery lines prior to proportional dosing. It can also be used if a particular product needs to be dosed quickly within a given period. The following pumping rates will be achieved when the Select doser is set to “prime”:

Pump Tube Colour	Priming pump rate
Red	13.5 litres / hour
Green	6.6 litres / hour
Blue	1.78 litres / hour
Black	405 ml/hr

It is not recommended to use the Select doser for more than 2 hours at a time in the priming mode, as tube and motor life will be reduced.

### Rotor Adjustment

The rotors in the Select pump head are sprung and designed to give maximum operating pressure whilst preserving tube life as much as possible. The rotor should not need adjustment, but exceptionally small variations in pump tube dimensions might lead to the rotor either not turning or turning too easily and not fully occluding the pump tube.

**ENSURE EITHER THE PUMP IS DISCONNECTED FROM THE POWER SUPPLY OR THE SIGNAL LINE FROM THE FLOW SENSOR IS DISCONNECTED BEFORE MAKING ADJUSTMENTS TO THE ROTOR**

Should the rotor not turn against the pump tube (particularly after fitting a new pump tube) screw in the cross head screws on either side of the rotor by no more than 1/8 turn and equally for both rotors. Test if the rotor turns freely (by running the pump) and repeat the tightening process if necessary. If the screws are tightened too much the pump tube will not be fully occluded and the pump will not perform correctly.

If the pump is showing signs of not sucking up product from the additive container, or not being able to pump up to 2 bar pressure in the drinking lines, it is possible the rotor adjustment screws might need to be loosened. Adjust each screw equally and by no more than 1/8 turn before re-testing the pump. If the screws are over-loosened the rotor will not turn against the pump tube.

In case of difficulty, consult your supplier.

**Installation**

The Select doser can be powered from a 12V DC battery or via a transformer from the mains electricity supply. Position the dosing point on the drinking lines so as to be convenient for a power source if power is to be taken via a transformer from the mains. Ensure that the Select doser is properly secured to prevent it becoming immersed in water or stock additive solution.

The flow sensor is fitted with standard fittings which will need to be adapted to fit into existing pipe-work. Use PTFE tape as necessary to ensure leak-free fitting. Avoid undue strain on the flow sensor during fitting as damage to the sensor may result. The use of a water filter immediately upstream of the flow sensor is recommended. Ensure flow is in the direction as indicated on the flow sensor.

If the quick fit saddle clamp is being used drain the drinking line, drill a 5mm (approx.) hole in the pipe, ensure that the 'O' ring is in position inside the clamp, and tighten clamp over the hole in the pipe. (Alternatively the doser may be supplied with a threaded T piece). The connector is valved. The valve is opened once the male end on the delivery tube is pushed home.

Connect the signal cable from the flow sensor into the Select doser unit. Connect the Select doser to either battery or transformer. Choose program options from the control screen. Ensure pump tube fitted and connected to inlet and outlet delivery tubes. Place inlet tube weight into additive liquid. Connect delivery outlet tube into quick-fit connector clamp. Commence proportional dosing.

Note: The pump will self prime. The pump can also be run dry without damaging any parts although it is not recommended to run the pump dry for extended periods.

**Pumping Problems / Errors**

If the Select doser fails to operate correctly, check the following: (If the problem can not be resolved – contact your Distributor)

<b>Problem</b>	<b>Solution</b>
Rotor jamming against the pump tube.	Tighten cross-head adjustment screws on rotor as described in the section "Rotor Adjustment" above.
Error message "High Water" showing on screen.	<ol style="list-style-type: none"> <li>1. Problem may have passed, check if max. water flow is still being exceeded</li> <li>2. Consider using more concentrated stock solution at a lower inclusion ratio.</li> <li>3. Possible pump fault. Contact your Distributor.</li> </ol>
Incorrect dosing.	<ol style="list-style-type: none"> <li>1. Check for low battery power (If external battery is in use)</li> <li>2. Pump tube should be replaced at least monthly. Replace if necessary</li> <li>3. Flow sensor could be entangled with debris. Check and clean if necessary. NOTE: clear carefully – delicate mechanism. Fit filter up-stream of sensor and clean regularly.</li> <li>4. Is correct dosing ratio selected?</li> <li>5. Water pressure in the drinking water line should not exceed 2 bar. Fit pressure reduction device if necessary.</li> <li>6. Incorrect Tube Factor entered on the control</li> </ol>

	7. screen. Check and re-enter. Incorrect pump tube fitted. Are screen details correct?
Medication not being pumped from stock container.	1. Check all tube connections are firmly in place. 2. Pump rotor may not be fully occluding the pump tube. Release cross-head adjustment screws on rotor as described in the section "Rotor Adjustment" above. (See "pressure loss" below) 3. Inlet tube could be blocked. Clear as necessary.
Sudden loss of pumping pressure (with possible return of fluid into stock container)	1 Check if there is any lateral movement in the rotor. It is possible the rotor shaft bearings may have worn. Consult Distributor. 2 Check for physical damage to pump head fixing screws. If the pump head is loose, pressure will be lost. <b>DO NOT OVER-TIGHTEN FIXING SCREWS</b> 3 Check that non-return valve is fitted in delivery line
Error message "pump error"	A failure of the motor or data encoder is indicated. Check that connections to circuit board from motor are in place. Consult Distributor.
Proportional dosing does not commence	1. Check flow sensor connected 2. Check there is water flow 3. Is power supply sufficient?

### Maintenance

#### **Weekly**

Flush out filters protecting the flow sensor.

Inspect the pump tube for signs of wear.

Check doser output. Adjust as necessary via the control screen.

#### **Monthly**

Replace pump tube monthly or sooner if any of the following occur:

- Sharply increased rate of dosing
- Split tube

#### **Each 6 Months**

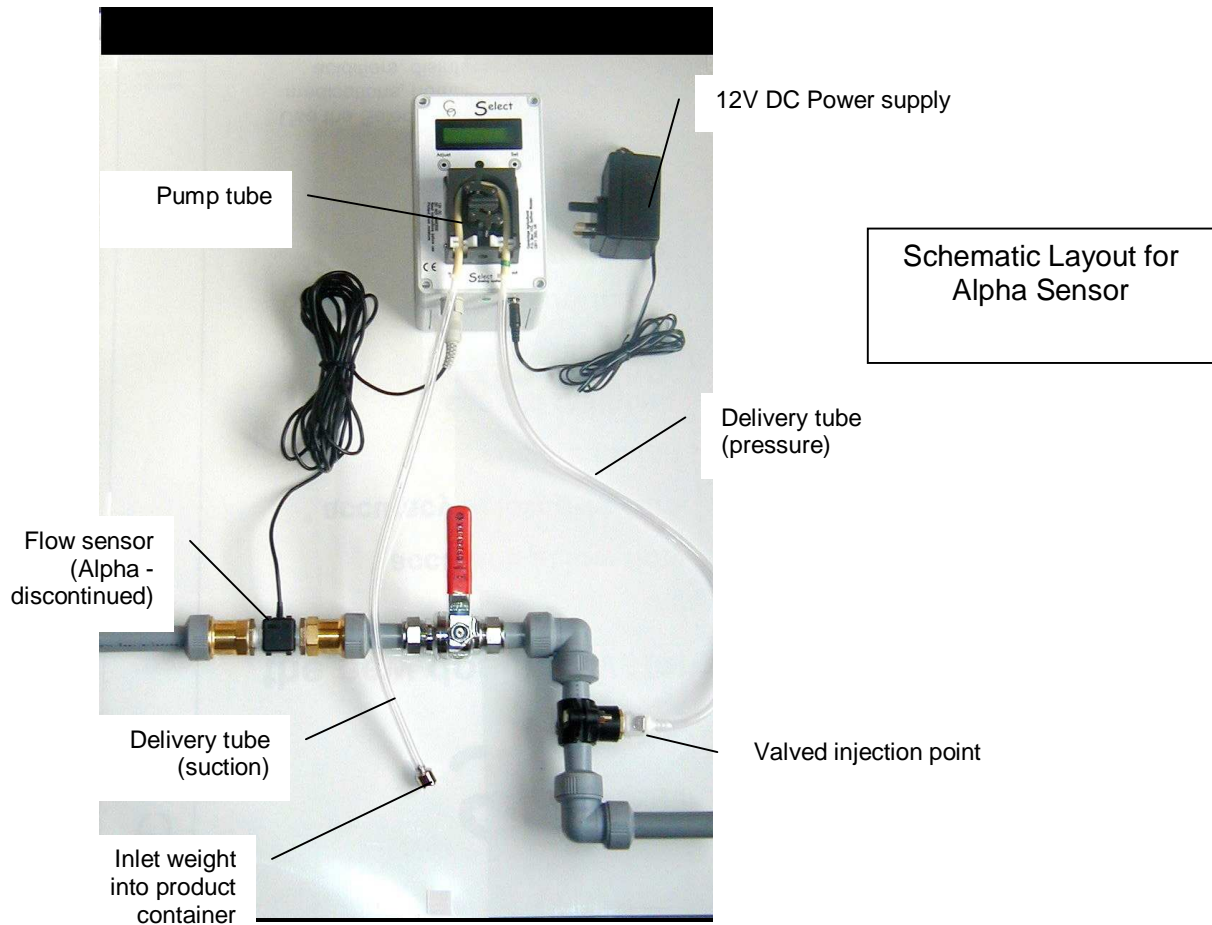
After disconnecting from electric supply, remove cover from Select doser and inspect interior of pump enclosure. Ensure no ingress of moisture or other contaminant. In case of difficulty, contact your supplier.

### Spare Parts and Accessories

Item		Code
Select Livestock doser unit with VTH25 sensor	Unit	400CA25
Select Livestock doser unit with VTH40 sensor	Unit	400CA75
Flow sensor (VTH25)	unit	160CA05
Flow sensor (VTH40)	unit	160CA08
Saddle pipe clamp	25mm	105CA25
Saddle pipe clamp	32mm	105CA32
Replacement pump tube pack – 10 tubes	red	161CA48/REP
Replacement pump tube pack – 10 tubes	green	161CA32/REP
Replacement pump tube pack – 10 tubes	blue	161CA16/REP
Replacement pump tube pack – 10 tubes	black	161CA08/REP
Delivery tube (low pressure)	30m	155CA48
Inlet tube (3m) plus end weight	unit	152CA05
Quick-fit male/female connector	unit	153CA02
12V DC power supply (UK)	unit	169CA00
12V DC power supply (European)	unit	169CA50

<b>Max and Min water flows – all tubes, all ratios</b>
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Ratio 1:		Water		Ratio 1:		Water	
		Min flow	max flow			Min flow	max flow
100,000	White	180	19,200	500	White	0.09	96
100,000	Black	450	48,000	500	Black	2	240
100,000	Blue	1,980	211,200	500	Blue	10	1,056
100,000	Green	7,290	777,600	500	Green	36	3,888
100,000	Red	14,940	1,593,600	500	Red	75	7,968
33,333	White	60	6,400	333	White	0	63
33,333	Black	150	16,000	333	Black	1	159
33,333	Blue	660	70,399	333	Blue	6	703
33,333	Green	2,430	259,197	333	Green	23	2,589
33,333	Red	4,980	531,195	333	Red	50	5,306
20,000	White	36	3,840	200	White	0	38
20,000	Black	90	9,600	200	Black	1	96
20,000	Blue	396	42,240	200	Blue	4	422
20,000	Green	1,458	155,520	200	Green	15	1,555
20,000	Red	2,988	318,720	200	Red	30	3,187
10,000	White	18	1,920	100	White	0	19
10,000	Black	45	4,800	100	Black	0	48
10,000	Blue	198	21,120	100	Blue	2	211
10,000	Green	729	77,760	100	Green	7	778
10,000	Red	1,494	159,360	100	Red	15	1,594
6,000	White	10	1,152	66	White	0	13
6,000	Black	27	2,880	66	Black	0	32
6,000	Blue	119	12,672	66	Blue	1	139
6,000	Green	437	46,656	66	Green	5	513
6,000	Red	896	95,616	66	Red	10	1,052
5,000	White	9	960	50	White	0	9
5,000	Black	23	2,400	50	Black	0	24
5,000	Blue	99	10,560	50	Blue	1	106
5,000	Green	365	38,880	50	Green	4	389
5,000	Red	747	79,680	50	Red	7	797
3,333	White	6	640	33	White	0	6
3,333	Black	15	1,600	33	Black	0	16
3,333	Blue	66	7,039	33	Blue	1	70
3,333	Green	243	25,917	33	Green	2	257
3,333	Red	498	53,115	33	Red	5	526
2,500	White	5	480	20	White	0	4
2,500	Black	11	1,200	20	Black	0	10
2,500	Blue	50	5,280	20	Blue	0	42
2,500	Green	182	19,440	20	Green	1	156
2,500	Red	374	39,840	20	Red	3	319
2,000	White	4	384	14	White		3
2,000	Black	9	960	14	Black		7
2,000	Blue	40	4,224	14	Blue		30
2,000	Green	146	15,552	14	Green		109
2,000	Red	299	31,872	14	Red		223
1,000	White	2	192				
1,000	Black	5	480				
1,000	Blue	20	2,112				
1,000	Green	73	7,776				
1,000	Red	149	15,936				



Schematic Layout for VTY10 Sensor (similar for other sensors)

