Innovation In and
Out of Parlour

E-Pulse Pulsation Control Manual

Version 1.20

Date - December 2015

Part Number - 39-0201

Manual Versions

Version 1.00 - January 2013	First Version of Manual (Software v1.00)
Version 1.10 - November 2015	Added Goat and Sheep Frequencies (Software v1.10)
Version 1.20 - December 2015	Corrected PCB Version Number and Wiring (Software v1.10)

About the E-Pulse Pulsation Control

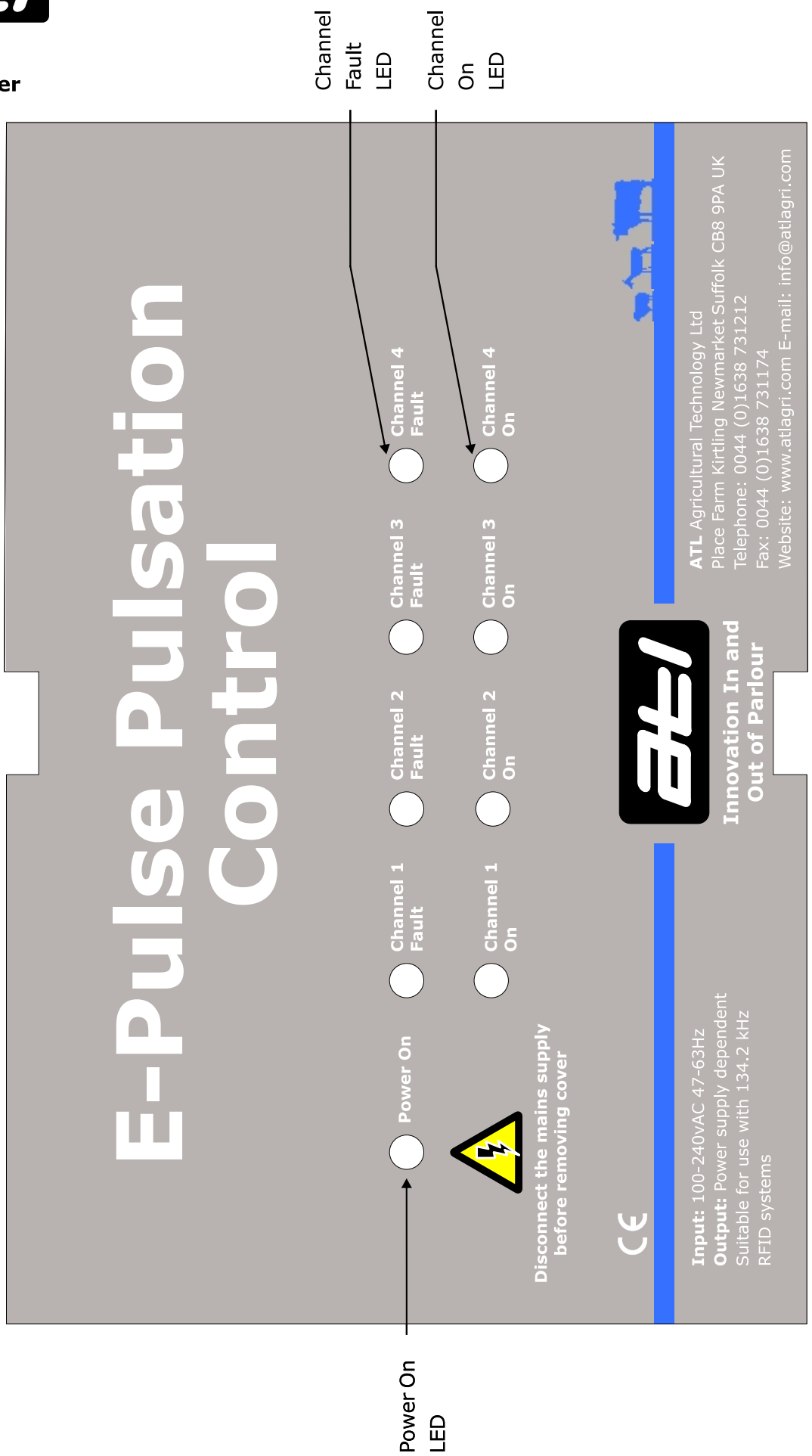
The E-Pulse pulsation control ensures precise pulsation and animal-friendly milk removal for cows, goats and sheep. The control uses 4 different, time shifted pulse periods for 4 groups of pulsators, to spread out air consumption and remove vacuum fluctuations, creating a ripple pulsation effect. The control caters for both simultaneous and alternate pulsation milking systems. It can control up to 24 pulsators (dependent upon solenoid coil rating - 24 pulsators is based upon 3.5 watts per solenoid coil as per ATL pulsators).

The control is available in either 12 volt DC or 24 volt DC versions (specified upon order).

Specifications

Ratios:	16 selectable ratios from 50% to 75%;
Frequency:	64 selectable frequencies from 50 to 182 pulses per minute;
Input Voltage:	100 -120 volt 50 - 60Hz or 200 - 240 volt 50 - 60Hz switch selectable;
Input Protection:	1A 20mm glass fuse, Over voltage and over temperature;
Output Voltage:	Either nominal 12 volt DC or nominal 24 volt DC (specified upon order);
Output Connectors:	4 switched negative and common positives for each channel;
Channel Indicator:	LED for each channel which illuminates when output is on;
Channel Fault Indicator:	LED for each channel which illuminates on output fault;
Pulsators:	Normally open (N/O) or normally closed (N/C) solenoids;
Capacity:	Maximum of 4.5 amps (current trip) or 37 watts per channel;
Power Supply:	Inbuilt 150 watt switch mode psu suitable for use with RFID systems.

Front Cover



Installation

The E-Pulse Unit must be mounted on a vertical wall within easy reach. Each channel is fuse protected inside the Control so access must be possible. The supply must be a 240volt 50Hz AC fused (5 Amps) switched mains outlet. A 13Amp plug and socket is not suitable.

Use round sheath three core cable 0.75csa through the fitted gland for the mains connection. Use the 4 port gland for connecting to the pulsators.

Use suitable cables for the valve (Ground -) connections (circa 1.0csa) and for the (+) common 'daisy chain' to the valves (circa 1.5csa).

If additional access holes are required they must be cut ONLY into the bottom edge of the box- NOT the top or sides.

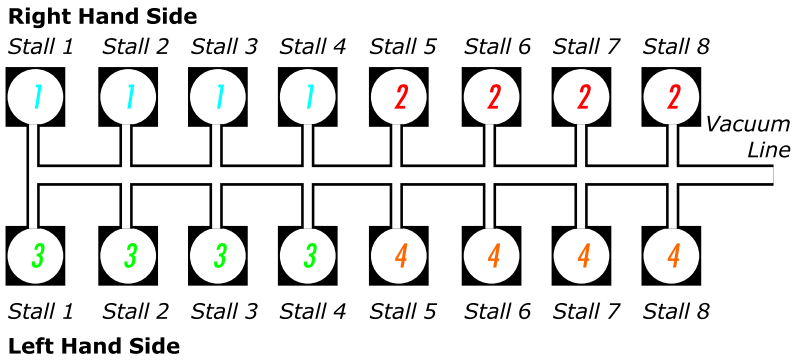
Each valve must be fitted with a diode (1N4002 or similar) across the terminals to prevent back EMF damaging the channel semiconductors. See diagram below.

Simultaneous Pulsation

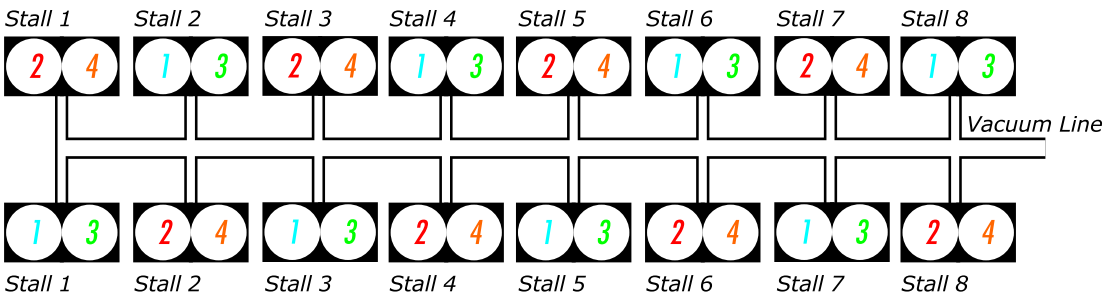
The illustration right shows a double 16 parlour with the E-Pulse in simultaneous configuration.

The parlour is divided into 4 quadrants each of four stalls with one E-Pulse channel driving each quadrant. There is only one solenoid valve to each stall, so all four teat cups for cows or two teat cups for goat and sheep on a cluster are pulsed together.

The numbers in white circles represent E-Pulse channels.



Important: E-Pulse uses NEGATIVE channel switching. The positive (+) is common and looped to all of the solenoid valves.



Alternate Pulsation

A double 16 parlour with E-Pulse alternate configuration is illustrated above. Every stall has two solenoid valves fitted, one for each pair of teat cups on the cluster for cows and one for each teat cup shell for goats and sheep.

The teat cup pairs may be arranged either diagonally, side to side or front-to-back and because they are connected to different E-Pulse channels, will pulse alternately.

The numbers in white circles represent the E-Pulse channels.

Solenoid Valve: Diode connections

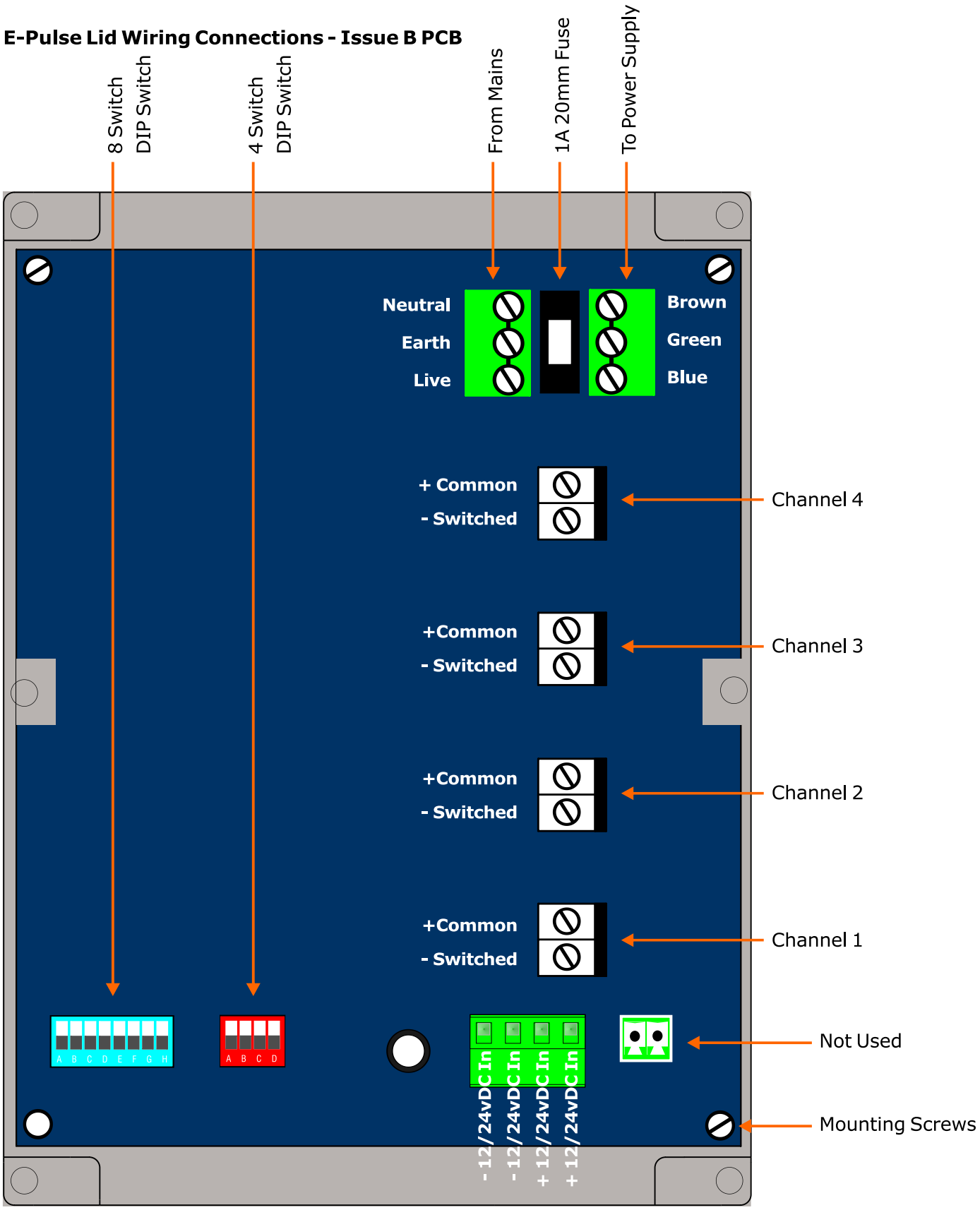
Common (+) 12volts to all Solenoid Valves.

Diode 1N4002 across terminals. Observe banding to (+) terminal.

Negative Switched: Channel 1, 2, 3 or 4

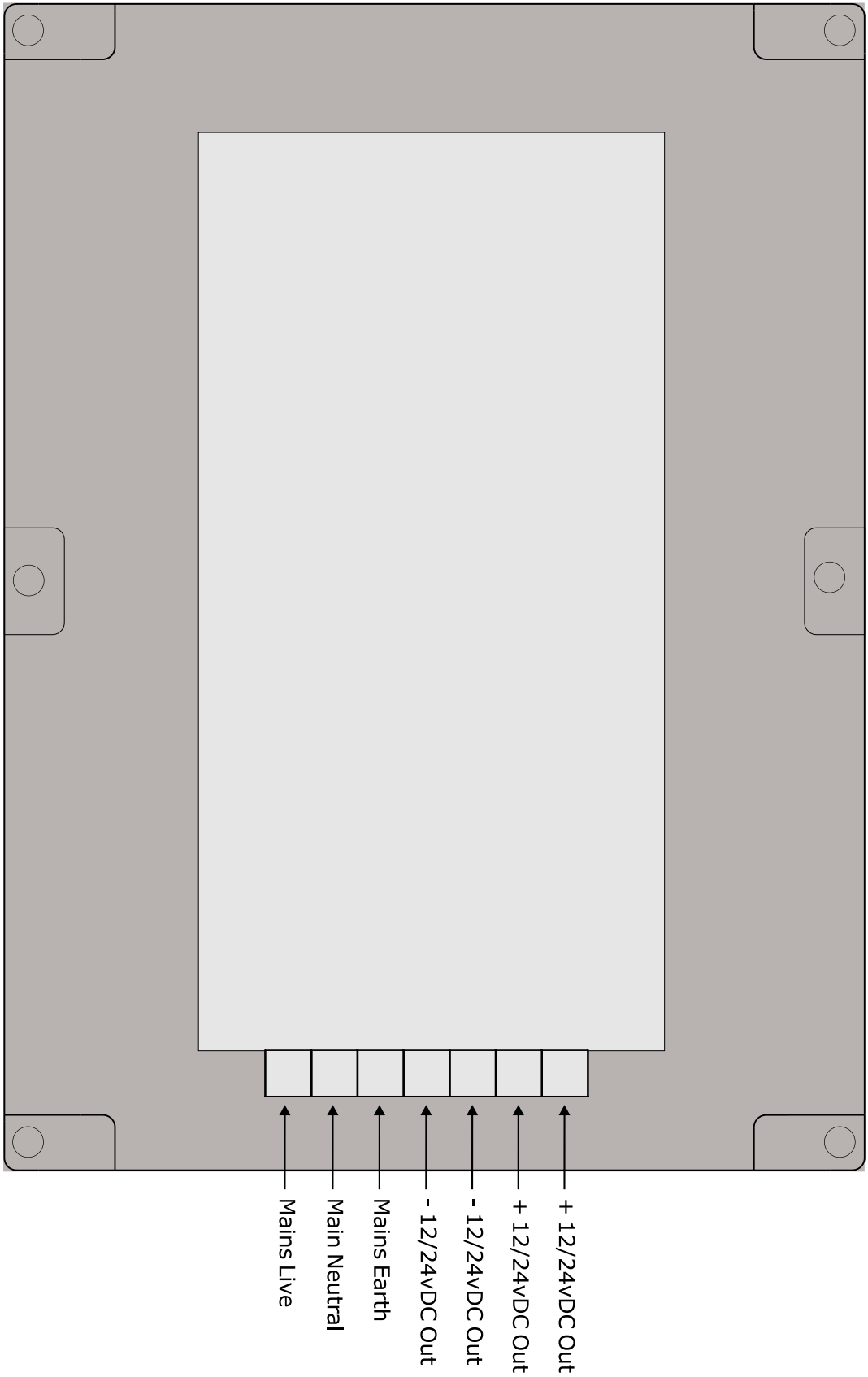
The vacuum line shown is a swing over parlour for diagrammatic simplicity. A doubled up parlour would have separate vacuum lines for each side.

E-Pulse Lid Wiring Connections - Issue B PCB



E-Pulse Base Wiring Connections

Base wiring is factory fitted. Diagram for reference only.



Setting Up the E-Pulse Pulsation Control

Caution: Adjustments are made to controls on the circuit board which is in close proximity to mains potential. Please disconnect the mains supply before removing the front cover.

Before switching on the Control Unit for the first time:

- Select the Type of Solenoid Valve being used. These can be either normally open or normally closed solenoid valves. For normally closed solenoids, switch B on the 4 switch DIP switch should be OFF. For normally open solenoids, switch B should be ON (inverted).
- Set the Pulse Ratio required. This is the ratio between time ON and time OFF for a single pulse. The settings range from 50% through to 75% in fixed steps (see table below) and the figure shown represents the time ON for a normally open valve. Selecting a setting of (say) 75% means that the valve will be ON (open) for 75% of the pulse and OFF (closed) for 25% of the pulse. These values remain the same for both normally closed and normally open valves; the electronic circuit decides when to energise the valve. The value chosen is set using four switches labelled A, B, C and D on the 8 switch DIP switch.
- Set the Frequency. This is the length of the pulse expressed in pulses per minute (ppm) and ranges from 50 to 182 ppm (shown in the tables overleaf), a range established as ideal for milking cows, goats and sheep. The value chosen is set using the four switches labelled E, F, G and H on the 8 switch DIP switch and the two switches C and D on the 4 switch DIP switch.

Ratio Settings

DIP Switch				Ratio %
A	**B**	**C**	**D**	
Off	Off	Off	Off	50
Off	Off	Off	*On*	52
Off	Off	*On*	Off	54
Off	Off	*On*	*On*	55
Off	*On*	Off	Off	56
Off	*On*	Off	*On*	58
Off	*On*	*On*	Off	59
Off	*On*	*On*	*On*	60
On	Off	Off	Off	61
On	Off	Off	*On*	62
On	Off	*On*	Off	63
On	Off	*On*	*On*	65
On	*On*	Off	Off	68
On	*On*	Off	*On*	70
On	*On*	*On*	Off	72
On	*On*	*On*	*On*	75

To save power, some solenoid valves are designed to be normally OPEN, which means that they are open and will pass a vacuum when un-energised; when power is applied to them they block the vacuum line. So, for a conventional setting of say 60% on and 40% off, for normally open valves these are swapped to become 60% off and 40%. To invert the ratios, see the section above 'select the Type of Solenoid Valve being used'.

Pulses per Minute - Cow Frequencies

8 Way DIP Switch				4 Way DIP Switch		
E	F	G	H	C	D	Pulses/Minute
Off	Off	Off	Off	Off	Off	50
Off	Off	Off	*On*	Off	Off	51
Off	Off	*On*	Off	Off	Off	52
Off	Off	*On*	*On*	Off	Off	53
Off	*On*	Off	Off	Off	Off	54
Off	*On*	Off	*On*	Off	Off	55
Off	*On*	*On*	Off	Off	Off	56
Off	*On*	*On*	*On*	Off	Off	57
On	Off	Off	Off	Off	Off	58
On	Off	Off	*On*	Off	Off	59
On	Off	*On*	Off	Off	Off	60
On	Off	*On*	*On*	Off	Off	61
On	*On*	Off	Off	Off	Off	62
On	*On*	Off	*On*	Off	Off	63
On	*On*	*On*	Off	Off	Off	64
On	*On*	*On*	*On*	Off	Off	65

Pulses per Minute - Goat Frequencies

8 Way DIP Switch				4 Way DIP Switch		
E	F	G	H	C	D	Pulses/Minute
Off	Off	Off	Off	*On*	Off	88
Off	Off	Off	*On*	*On*	Off	90
Off	Off	*On*	Off	*On*	Off	92
Off	Off	*On*	*On*	*On*	Off	94
Off	*On*	Off	Off	*On*	Off	96
Off	*On*	Off	*On*	*On*	Off	98
Off	*On*	*On*	Off	*On*	Off	100
Off	*On*	*On*	*On*	*On*	Off	102
On	Off	Off	Off	*On*	Off	104
On	Off	Off	*On*	*On*	Off	106
On	Off	*On*	Off	*On*	Off	108
On	Off	*On*	*On*	*On*	Off	110
On	*On*	Off	Off	*On*	Off	112
On	*On*	Off	*On*	*On*	Off	114
On	*On*	*On*	Off	*On*	Off	116
On	*On*	*On*	*On*	*On*	Off	118

Pulses per Minute - Sheep Frequencies

8 Way DIP Switch				4 Way DIP Switch		
E	F	G	H	C	D	Pulses/Minute
Off	Off	Off	Off	Off	*On*	120
Off	Off	Off	*On*	Off	*On*	122
Off	Off	*On*	Off	Off	*On*	124
Off	Off	*On*	*On*	Off	*On*	126
Off	*On*	Off	Off	Off	*On*	128
Off	*On*	Off	*On*	Off	*On*	130
Off	*On*	*On*	Off	Off	*On*	132
Off	*On*	*On*	*On*	Off	*On*	134
On	Off	Off	Off	Off	*On*	136
On	Off	Off	*On*	Off	*On*	138
On	Off	*On*	Off	Off	*On*	140
On	Off	*On*	*On*	Off	*On*	142
On	*On*	Off	Off	Off	*On*	144
On	*On*	Off	*On*	Off	*On*	146
On	*On*	*On*	Off	Off	*On*	148
On	*On*	*On*	*On*	Off	*On*	150

Pulses per Minute - Sheep Frequencies

8 Way DIP Switch				4 Way DIP Switch		
E	F	G	H	C	D	Pulses/Minute
Off	Off	Off	Off	*On*	*On*	152
Off	Off	Off	*On*	*On*	*On*	154
Off	Off	*On*	Off	*On*	*On*	156
Off	Off	*On*	*On*	*On*	*On*	158
Off	*On*	Off	Off	*On*	*On*	160
Off	*On*	Off	*On*	*On*	*On*	162
Off	*On*	*On*	Off	*On*	*On*	164
Off	*On*	*On*	*On*	*On*	*On*	166
On	Off	Off	Off	*On*	*On*	168
On	Off	Off	*On*	*On*	*On*	170
On	Off	*On*	Off	*On*	*On*	172
On	Off	*On*	*On*	*On*	*On*	174
On	*On*	Off	Off	*On*	*On*	176
On	*On*	Off	*On*	*On*	*On*	178
On	*On*	*On*	Off	*On*	*On*	180
On	*On*	*On*	*On*	*On*	*On*	182