



INSTRUCTION MANUAL

Model: BC

Batch Controller



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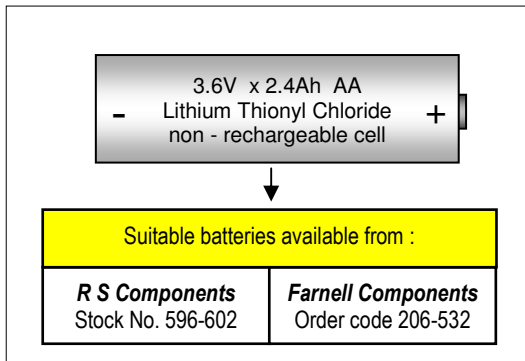
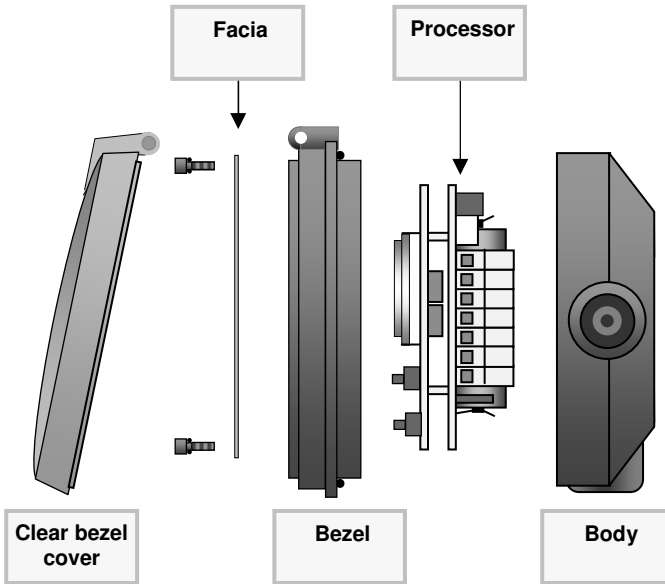
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4 Introduction

1.1 Description of elements



1.2 Specifications

Display :	8 digit alpha numeric LCD characters 9mm (0.35 ") high with second line sub script text. 8 digits totalising, 3 programmable decimal points, 5 digits for Total number of batches.
Functions :	Batch total, Accumulated total & Total number of batches (TNB).
Configuration :	Flow chart entry of data with scrolling English text prompts. User selectable 4 digit PIN number set-up protection. Programmable decimal points and K-factors. All programmed data and batch status are E ² PROM protected in the event of a power failure.
Signal Input :	Universal pulse/frequency input compatible with Reed switch, Hall effect, Namur proximity detectors, Pulse wire, voltage, current & Coil (<i>15mV P-P min</i>). Max. input frequency 10Khz.
Power requirement :	Regulated 12~24Vdc x 50mA (<i>add switched current</i>).
Battery :	3.6Vdc lithium battery annunciates a power loss & preserves batch settings & progress at time of power loss.
Control outputs :	Two independent NPN open collectors, 1A dc resistive load max. May be link configured for PNP to drive compatible logic circuits.
Alarm / pulse output :	NPN-PNP solid state alarm or non-scaleable pulse output @ terminal 7, (5000hz max.), 1A maximum drive capability.
Batch status output :	NPN open collector, 0.1A dc resistive load max. (<i>page 16</i>).
K-factor range :	Eg. Pulses/litre, gallon, lb etc. Programmable range is 0.001~9999999.999 with a floating decimal point during K-factor entry.
Engineering units :	Selectable Ltr, gal, m3, kgs, lbs (<i>maximum 8 digits of batch</i>).
Count direction :	Count UP or count DOWN selectable at program level.
Automatic overrun : compensation	AOC enabled-disabled selection at programming level (<i>page 13</i>).
Batch limiting :	Batch size limits can be set at programming level (<i>page 13</i>).
Run inhibit input :	Run key can be inhibited from an external source (<i>page 16</i>).
Network I/O :	A two wire loop system can link up to 9 individual batch controllers with one common flowmeter to provide an economical multi source/dispense interlocked batching system (<i>page 18</i>).
Physical :	<p>A) IP66 / 67 high impact glass reinforced nylon enclosure.</p> <p>B) 3 x M20 or ½" NPT female conduit entries.</p> <p>C) 125mm diameter (5") x 61mm deep (2.5") x 400g (0.9lb).</p> <p>D) Temperature range from -20°C to +80°C (-4°F to +176°F).</p>

1.3 Overview

The BC Ecobatch is a dc powered high speed batch controller specifically designed for liquid batching using a flowmeter with a pulse or frequency output.

BC Ecobatch is push button programmable with PIN protection and an internal battery is provided allowing pre-programming without applying power. The large LCD provides batch quantity in selected engineering units, batch status and has scrolling English prompts to make programming easy.

Two independent output relays, the second with programmable start delay and pre-stop, enable pump and valve control or 2 stage flow phasing at the start and end of each batch. Precise batching is aided by Automatic Overrun Compensation which, when enabled, automatically manages variations in system time lags which could otherwise lead to discrepancies in dispensed quantity.

Safety features includes for an alarm output and automatic cessation of batching if no flow input is detected and programmable batch limiting protects against setting an oversize batch quantity. Scrolling messages on the LCD annunciate any alarm fault conditions.

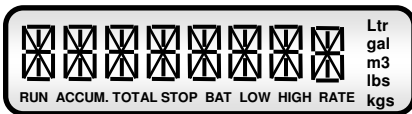
Control features include batch count up or down, remote operational switch interface, run inhibit interlock and batch status output. The BC Ecobatch is capable of networking with up to 9 batch controllers using one common flowmeter.

Environments

The BC Ecobatch is designed to suit harsh indoor and outdoor industrial environments & conforms to EMC directives. The housing is weatherproof to IP66/67 (Nema 4X) standards, UV resistant, robust glass re-enforced plastic with stainless steel screws & viton O-ring seals.

BC Ecobatch can be mounted on a variety of flowmeters or as a stand alone instrument for wall, surface, pipe or panel mount. Various mounting kits are available.

1.4 LCD displays



Full LCD display test feature illuminates all display segments and script text displays for 5 seconds when entering the program mode.



Up to 8 digits of **Batch** quantity programmable for up to 3 decimal places. English prompts clearly show the status of the batch.



An 5 digit **TNB** display shows the Total number of batches dispenced since last reset (*reset of TNB and Accumulative Total is only possible whilst in the program mode*).



The 8 digit **Accumulative Total** display can be programmed for up to 3 decimal places. Reset is only possible when in the program mode which can be PIN protected for security.

2. OPERATION

2.1 Batch set : Pressing the Batch set key allows the user to enter a batch value by using the arrowed keys to select the appropriate digits and change their value. Pressing Batch set again enters & confirms that the new batch value has been entered.

2.2 Run : Press RESET then RUN to start the batch. If there are no interruptions the batch controller will automatically stop the batch once the batch value has been reached.


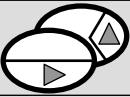







2.3 Stop : Pressing the STOP key at any time during the batch will cause the batcher to go into a "PAUSED" state and the output relays will be turned off. At this point the user can resume batching by pressing the RUN key or abort the batch by pressing the RESET key.

2.4 Batch Total : The batch value is displayed in all normal operational modes.

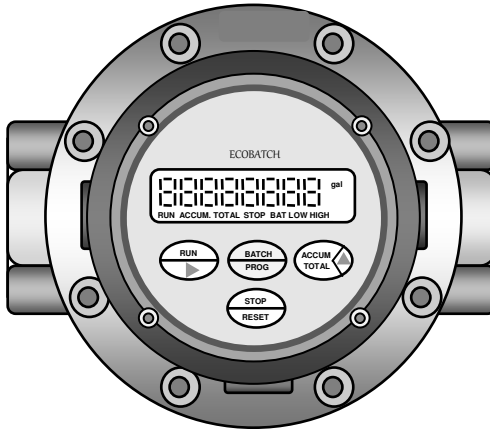
2.5 Accumulative Total : Accumulative total can be reset in the program mode. The accumulative total is displayed momentarily by pressing the ACCUM TOTAL key.

2.6 TNB display (Total number of batches) : BC Ecobatch will accumulate the total number of individual completed batches. Reset of TNB is simultaneous with the resetting of the Accumulative total in program mode. To view the TNB value simultaneously press & hold the two top right hand keys (Prog. & Accum Tot).

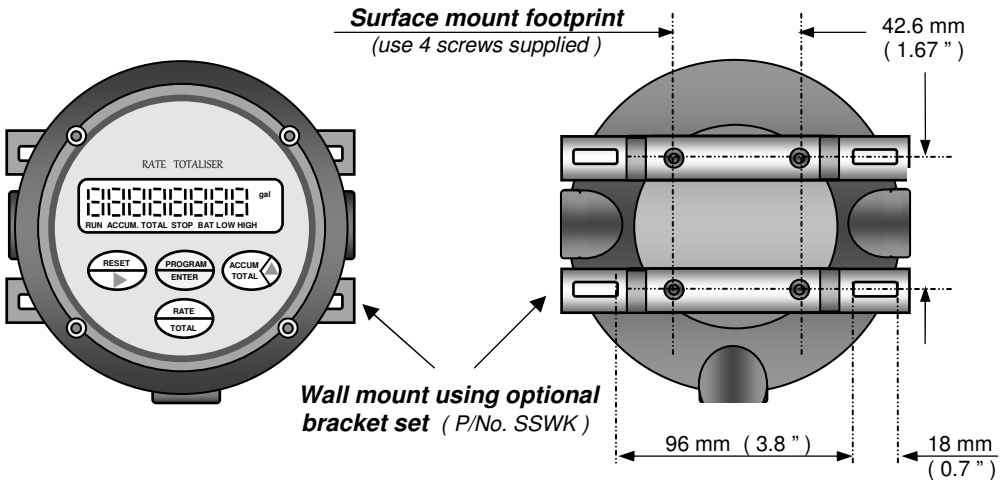
2.7 Keypad functions :

KEY	FUNCTION IN OPERATING MODE	FUNCTION IN PROGRAM MODE
	1) Enters & Exits the batch set mode. 2) May be pressed during batching to show batch pre-set value, this action will not interfere with the batch process.	No function
	 Selects the digit to be Indexed (digit will flash)	 Increments the selected digit (selected digit will be flashing)
	1) Starts a batch 2) Resumes a batch if paused	No function
	Pauses a batch during batching	Pressing PROG & STOP keys for 5 sec. gives entry to the program mode
	1. Resets the batch to the last pre-set value. 2. Resets individual digits to zero when in the BATCH SET mode.	No function
	1) Displays Unit ID number followed by the Accumulative Total as the key is held. 2) Displays total number of batches (press Accum. Total & Prog. keys at the same time)	No function
	Pressing PROGRAM & ACCUM TOTAL keys displays the Total Number of Batches (TNB)	1) Pressing PROGRAM & STOP keys for 5 seconds gives entry to the program mode. 2) Steps you through the program ladder. 3) Holding for 3 secs. fast tracks to end prog.

3.1 Mounting

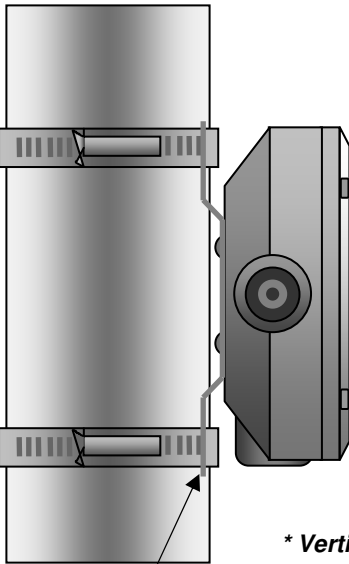


**Integral meter
mount**

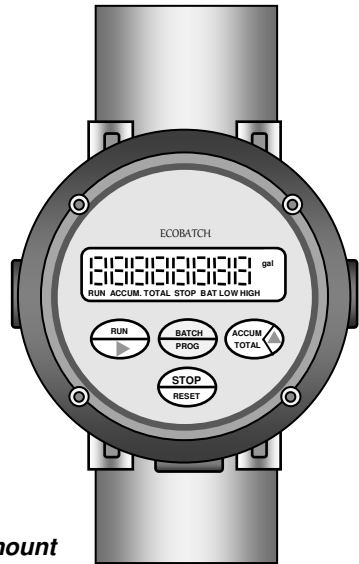


**Wall mount using optional
bracket set (P/No. SSWK)**

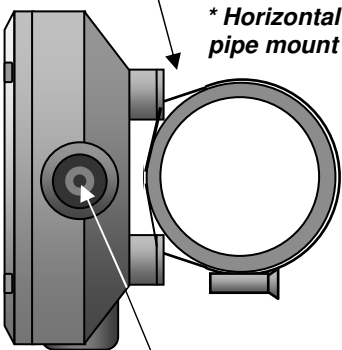
3.1 Mounting



*** Vertical pipe mount**

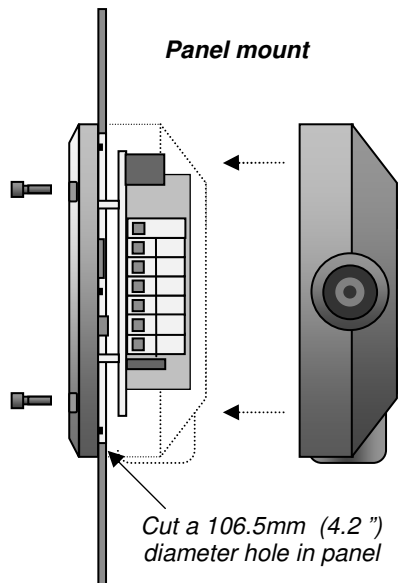


* order Pipe mount kit P/No. SSPK comprising two brackets, screws and worm drive clamps.



*** Horizontal pipe mount**

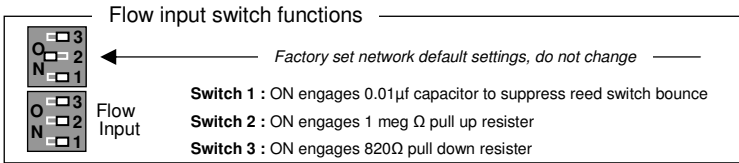
Conduit entries have an integral moulded seal, to remove break seal out using suitable lever (eg. screwdriver or rod)



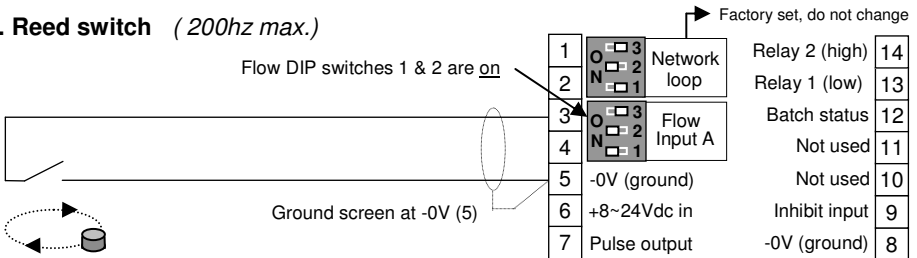
Panel mount

Cut a 106.5mm (4.2 ") diameter hole in panel

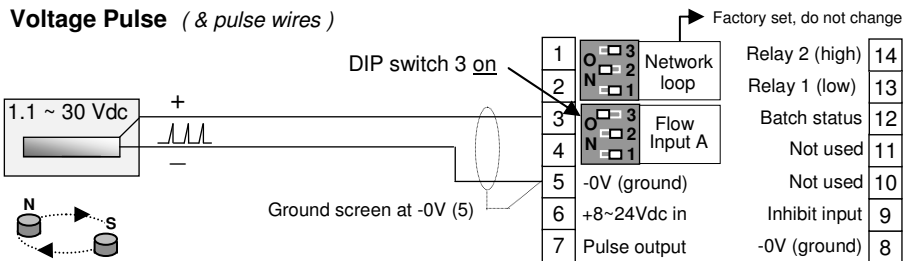
3.2 Flowmeter connections (unpowered sensors)



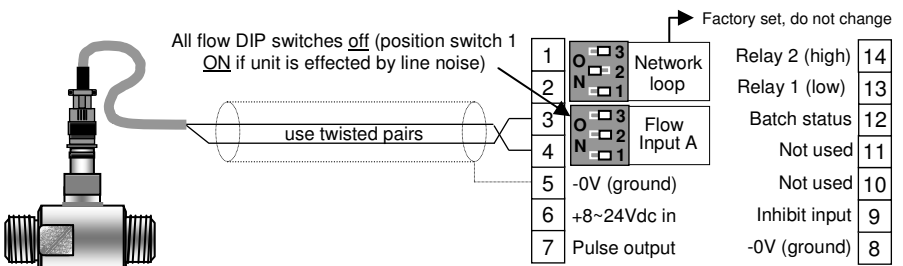
1. Reed switch (200hz max.)



2. Voltage Pulse (& pulse wires)

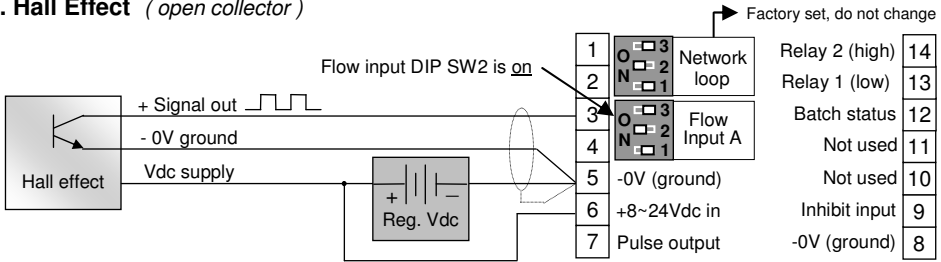


3. Coil (Turbine & paddle style flowmeters)

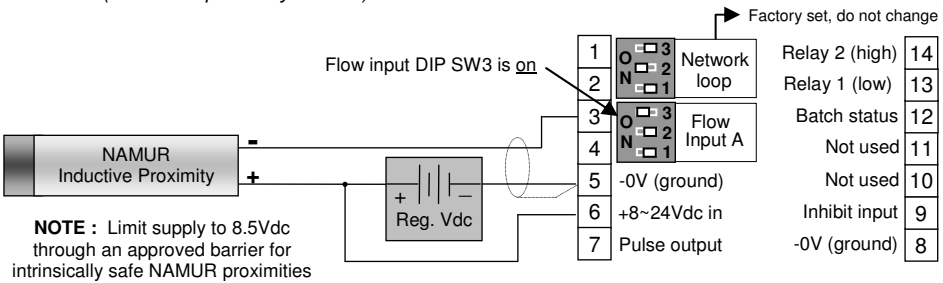


3.2 Flowmeter connections (powered sensors)

4. Hall Effect (open collector)

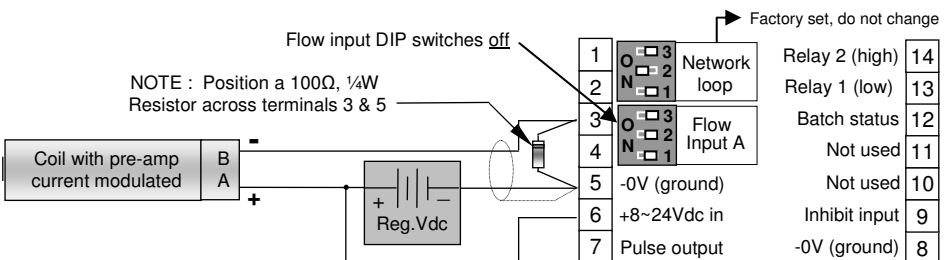


5. Namur (inductive proximity switch)



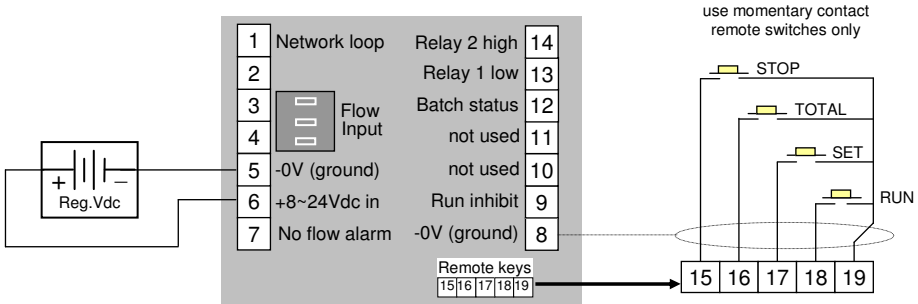
6. Current modulated pulse

(4mA to 20mA pulse amplitude)



3.3 Wiring connections

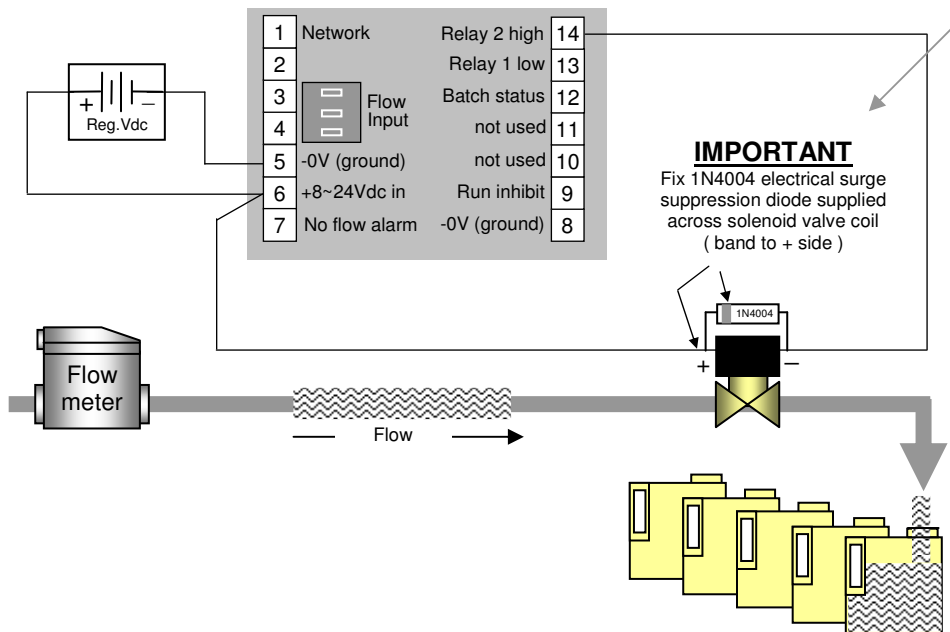
Powering & Remote switches (remote keys)



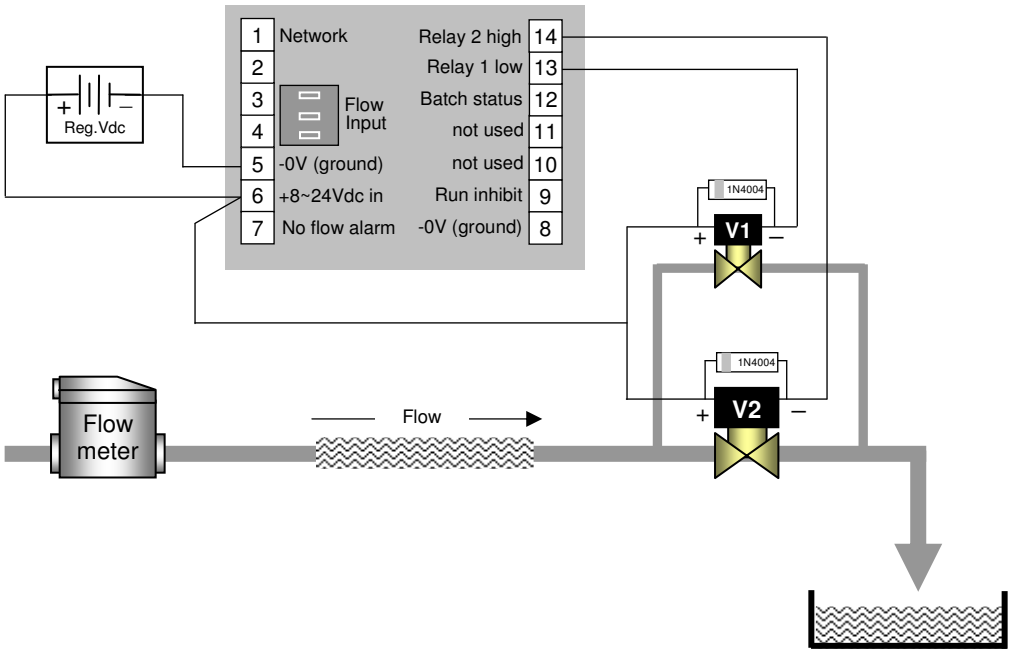
Wiring requirements : Use multi-core screened twisted pair instrument cable (0.25~0.5mm²) for electrical connection between the Ecobatch and any flowmeter or remote switch input. The screen needs to be grounded at -0V (terminal 8), this is to protect the transmitted signal from mutual inductive interference.

Instrument cabling should not be run in a common conduit or parallel with power or high inductive load cables. Power surges & power line frequencies may induce erroneous noise transients onto the signal. Run instrument cables in a separate conduit or with other instrument cables.

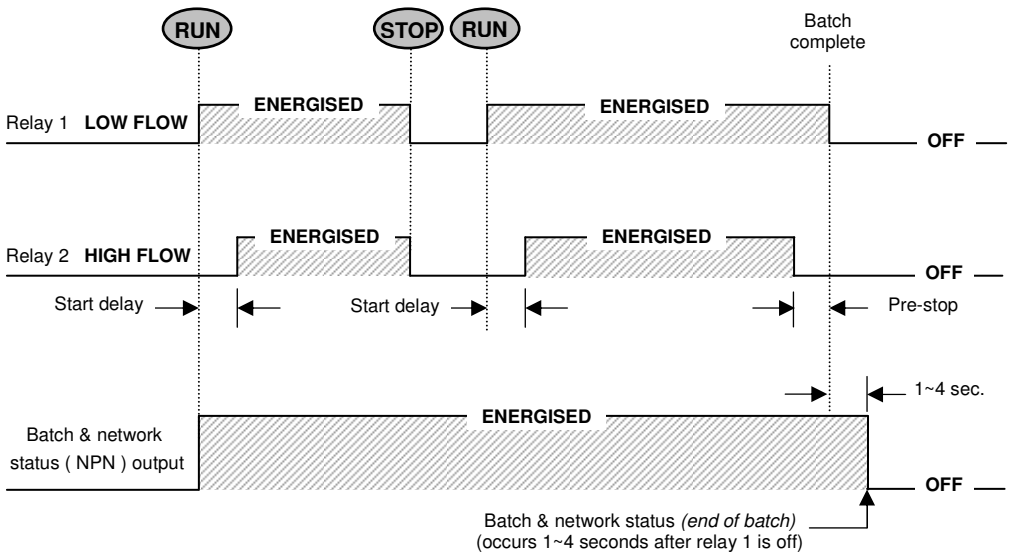
Single Stage Control (use relay 1 or 2, relay 2 has pre-stop programming capability)



Two Stage Control (using relays 1 & 2)



Relay Control Logic



4. PROGRAM PARAMETERS

4.1 PIN No. Program Protection

Any user defined PIN number other than 0000 will engage the program protection feature, failure to input the correct PIN number will deny the ability to change any of the program parameters but will allow the user to step through and view the existing program parameters.

Only one PIN number may be set but this can be changed at any time after gaining access through PIN entry. A second back up PIN number is installed at the factory should the programmed PIN be lost or forgotten. (refer bottom of page 19 for the back up PIN No.)

4.2 Resetting Accumulated Total & Total Number of Batches (TNB)

Resetting the Accumulated Total & Total Number of Batches (TNB) is done at "RESET ACCUMULATIVE TOTALS " in the program mode. Both Accumulated Total & TNB are reset if you select YES at this program level.

4.3 Engineering Units (refer clause 1.4)

Select from available Engineering units to right of the display. No engineering units denote NIL set allowing the user to set up the instrument with other units of measure which are not available on the BC Ecobatch LCD display.

4.4 K-factor (scale factor)

Enter K-factor starting with the most significant number, up to 7 prime numbers & 3 decimal numbers can be entered. Trailing decimal numbers move into view as digits to the right are progressively selected, any significant digits which may move from view remain functional.

4.5 Decimal Points

Up to three decimals points can be selected for Batch Total or Accumulative Total.

4.6 Count Direction

BC Ecobatch can be programmed to count DOWN from a preset quantity or UP from zero. Overruns in the count down mode will show with a minus sign in front of the overrun value.

4.7 Start Delay & Pre-Stop

Relay 2 can be programmed to turn on a time period after the run signal is given then turn off again a preset number of litres, gallons etc. before the end of the batch. These operational features provide greater control over the dynamics of the batching process through soft start and/or soft stop or phasing of the control valves and/or pump control.

The Start Delay can be set from 0 seconds (no delay) to 999 seconds. The pre-stop range is 0 (no pre-stop) to 999 units of measure (litres or gallons etc.).

4.8 Automatic Overrun Compensation (AOC)

Most batching applications will have an inherent end of batch overrun due mainly to the response time of the process valve. Overrun can be compensated by closing the valve slightly before the batch value is reached so that the exact batch value is achieved by the time that the system comes to rest.

BC Ecobatch has an Automatic Overrun Compensation feature which when enabled will assess the degree of overrun on previous batches and automatically alters the close timing of the process valve so that the exact batch value is reached. This feature should not be enabled on batch processes which are subject to erratic or inconsistent flow conditions.

4.9 Missing Pulse Detection

When a value other than 00 seconds is set at Time Out (T / OUT) in the program mode, BC Ecobatch will monitor for loss of flowmeter input signal at all times when either of the control relays 1 & 2 are energised. If no pulses are received within the time out period (0~99 sec.) the controller will de-energise both control relays and scroll a "NO INPUT" message across the LCD display, at the same time it will turn on the "no flow alarm" output at terminal 7, (see page 17 for flow alarm connection detail).

At "NO INPUT " the user must acknowledge the alarm condition by pressing the STOP key once, the operator then has the option of continuing the batch by pressing the RUN key or aborting the batch by pressing the RESET key which will return the controller to the original batch set value.

4.10 Batch Limit

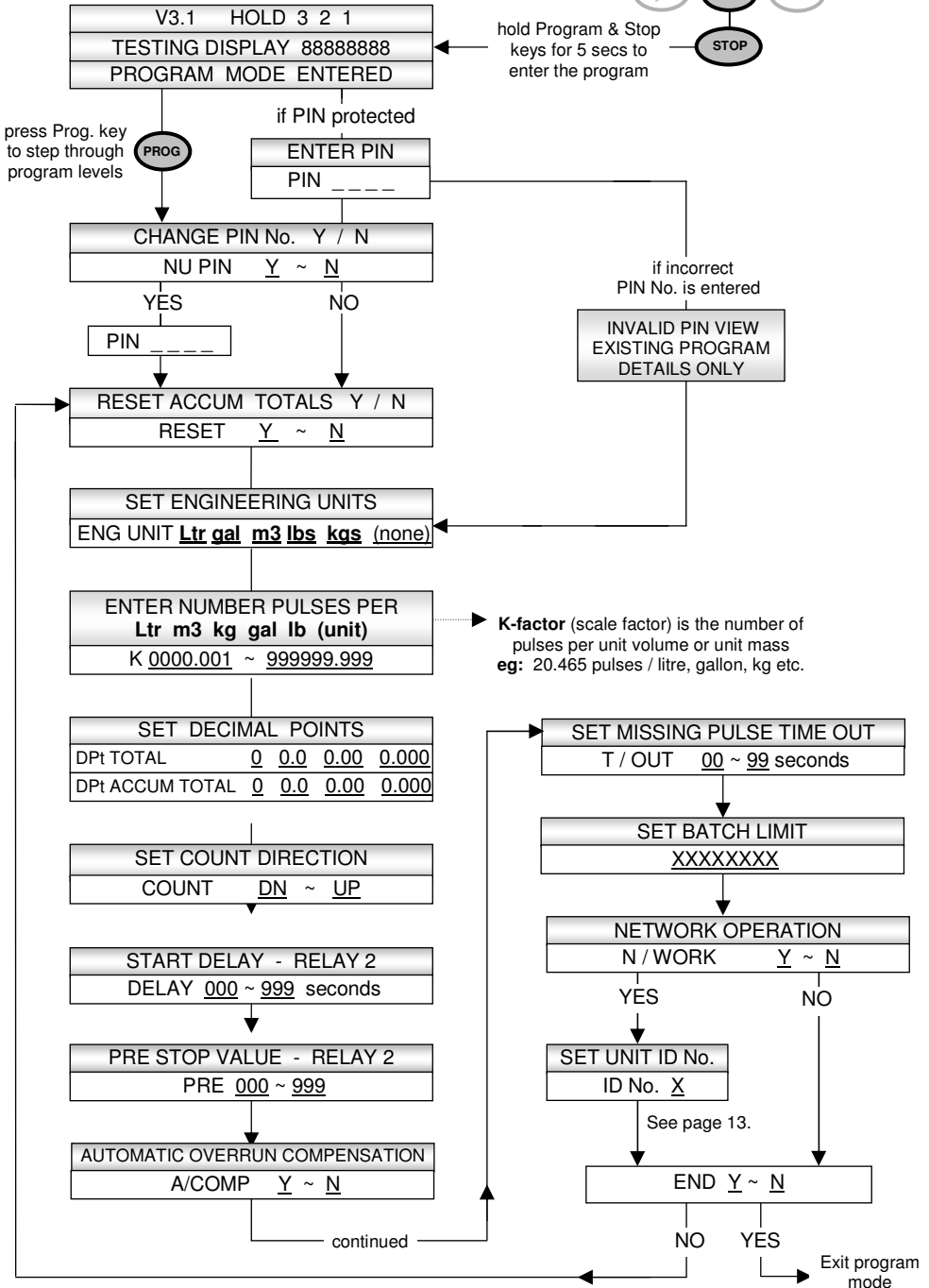
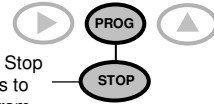
To avoid entering excessive batch quantities, a maximum batch limit can be set at the program level. BC Ecobatch will not accept a batch value which exceeds the batch limit, on rejecting an excessive batch value the controller will scroll the message "BATCH VALUE EXCEEDS BATCH LIMIT" and default to the batch limit on entry (batch set). Setting the batch limit to zero (0) will disable the batch limit feature.

4.11 Controller networking ID number

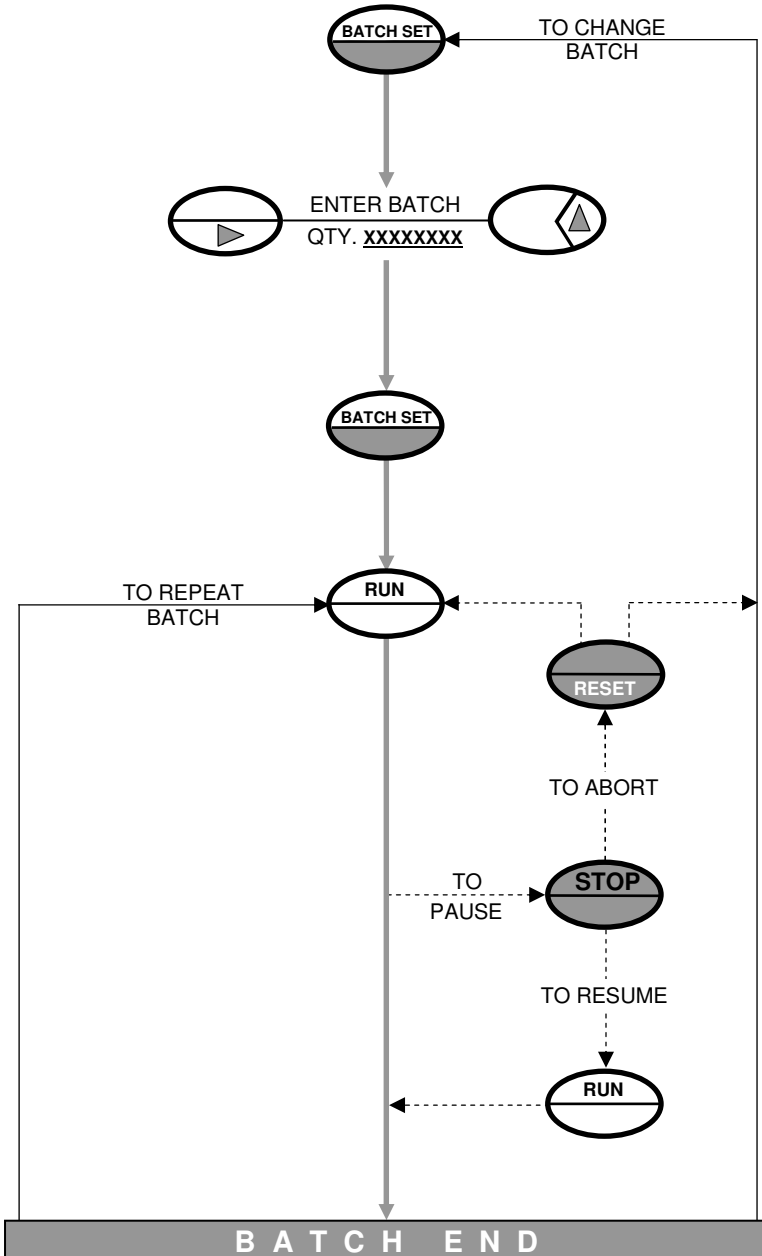
Each controller can be given a networking ID number in the range of 1~9. Allocating an ID number other than 0 is only necessary when a number of controllers are to be networked together for interlocking purposes (see page 18 for Controller Networking). Setting the ID number to zero inhibits this function.

Note : The instrument defaults out of the program mode if no program entries are made after 4 minutes.

5. PROGRAMMING FLOW CHART



6. BATCH OPERATING PROCEDURE

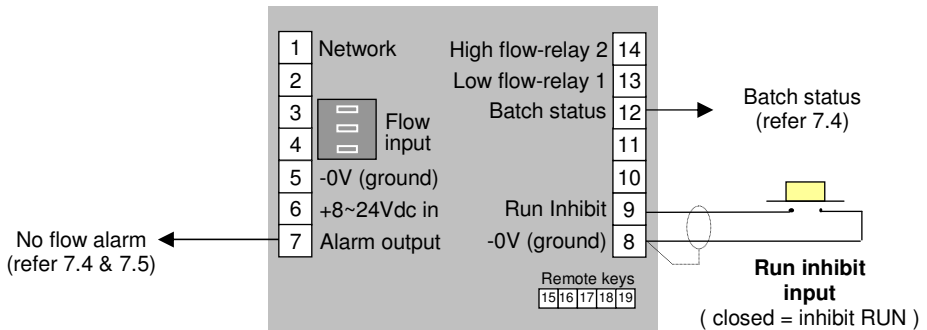


7. SECONDARY I/O

7.1 Batch Status Output

A solid state NPN output signal is switched on at terminal 12 when a batch is started, the signal remains on until the batch cycle is completely finished or the batch is stopped and aborted using the STOP & RESET keys.

The output is used to notify other control equipment when BC Ecobatch is in operation or is paused (*by pressing STOP*) or inhibited through an input at terminal 9 (*RUN inhibit*), the signal remains on under all three conditions. The signal can also be used to inhibit (*lock out*) other equipment whilst the controller is in use.



7.2 Alarm Output

An NPN/PNP selectable solid state output signal (*terminal 7*) is activated when the missing pulse detection feature detects a no flow condition (*refer 4.9*). NPN/PNP selection is to be in accordance with the connection options on the following page (17).

7.3 Run Inhibit Input

The RUN inhibit feature enables BC Ecobatch to interlock with other devices within the system or process when BC Ecobatch is in use.

When a contact is made across the Run inhibit input at terminal 9, a batch cannot be started and at the same time an “ENGAGED “ prompt will show on the LCD display. If the inhibit contact is made whilst a batch is running the batch will be paused. When the run function is inhibited it is still possible to enter a new batch quantity or review the accumulated totals but it will not allow the operator to RUN or re-start the batch until the inhibit input is released.

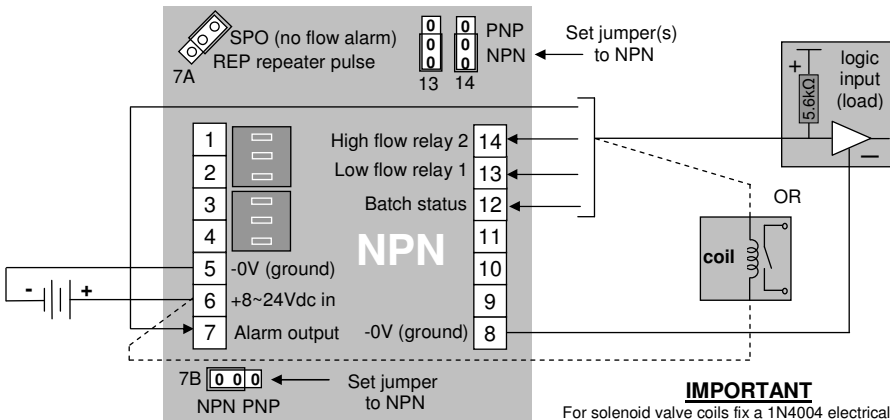
An example of this feature in practice is where a batch should not be allowed to RUN whilst a valve at another location is open.

7.4 Current Sinking outputs (NPN)

Current sinking derives its name from the fact that it “sinks current from a load”. When activated the current flows from the load into the appropriate output (terminals 7, 12, 13 & 14). NPN is the factory default configuration for the outputs. Refer to pages 10 & 11 for wiring control outputs.

Driving a logic input ——— The output voltage pulse is typically the internal voltage of the load. The load would normally have an internal pull up resistor on its input as shown.

Driving a coil - - - - - The NPN style of output is to be used when driving a coil. The coil load is obtained by dividing the coil voltage by coil impedance (Ω), is expressed in amps & is not to exceed 100mA at terminals 7 & 12 or 1A at terminals 13 & 14. The coil voltage is connected across & must match the EB supply voltage & the appropriate output (terminals 7, 12, 13 & 14).

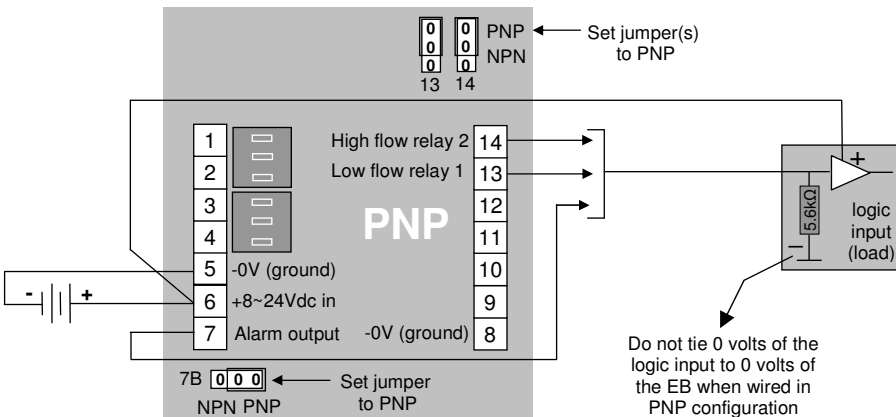


IMPORTANT

For solenoid valve coils fix a 1N4004 electrical surge suppression diode across the coil (refer page 10)

7.5 Current Sourcing outputs (PNP)

Current sourcing gets its name from the fact that it “sources current to a load”. When activated the current flows from the output (7,13 & 14) into the load. When wired as below the output voltage pulse is the supply voltage of the load. The load would normally have an internal pull down resistor on its input as shown.



Do not tie 0 volts of the logic input to 0 volts of the EB when wired in PNP configuration

8. CONTROLLER NETWORKING

BC Ecobatch has a unique networking feature which allows up to 9 individual batch controllers to be networked together with each being connected to one common flowmeter (see opposite).

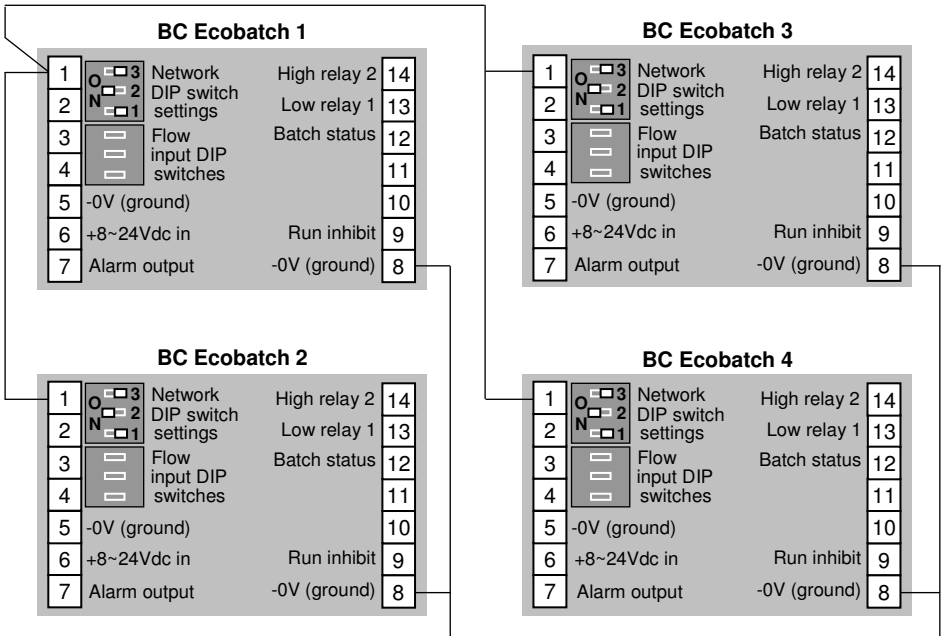
Typical applications are where one liquid is being dispensed to a number of individual outlets or a number of different liquids are to be batched via one common flowmeter. In either application each batch controller is wired to the same flowmeter but controls its own process control valve.

Networking takes place when any one controller is started, at this point the flowmeter input (count) is restricted to the controller in use, all other controllers will not count and their start function will be inhibited and an “ENGAGED” will scroll across the LCD display showing the ID number of the controller in use.

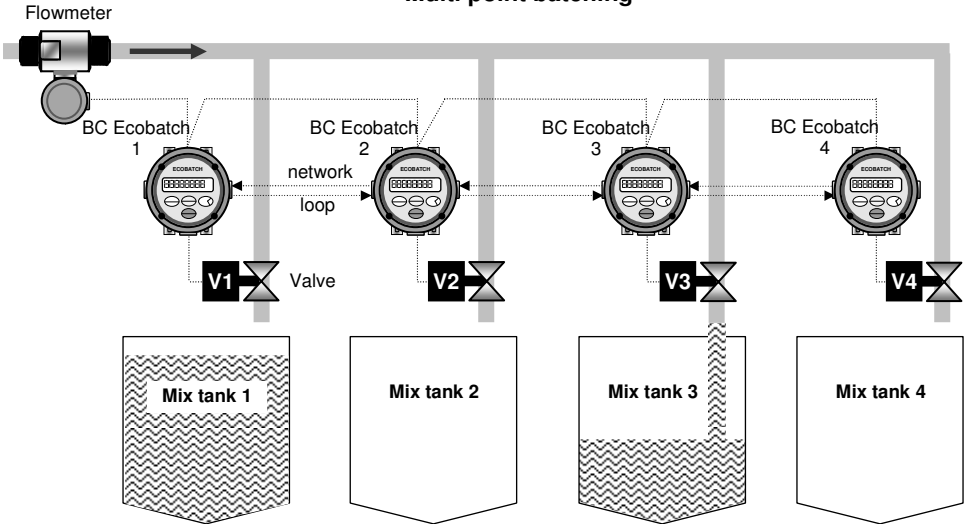
Batch entries can be made whilst individual batch controllers are inhibited (locked out) but they cannot be started until the controller in operation has completed its batch cycle.

For the network feature to work the network DIP switches must be set as shown & each batch controller MUST be programmed with an individual ID number other than 0 (zero).

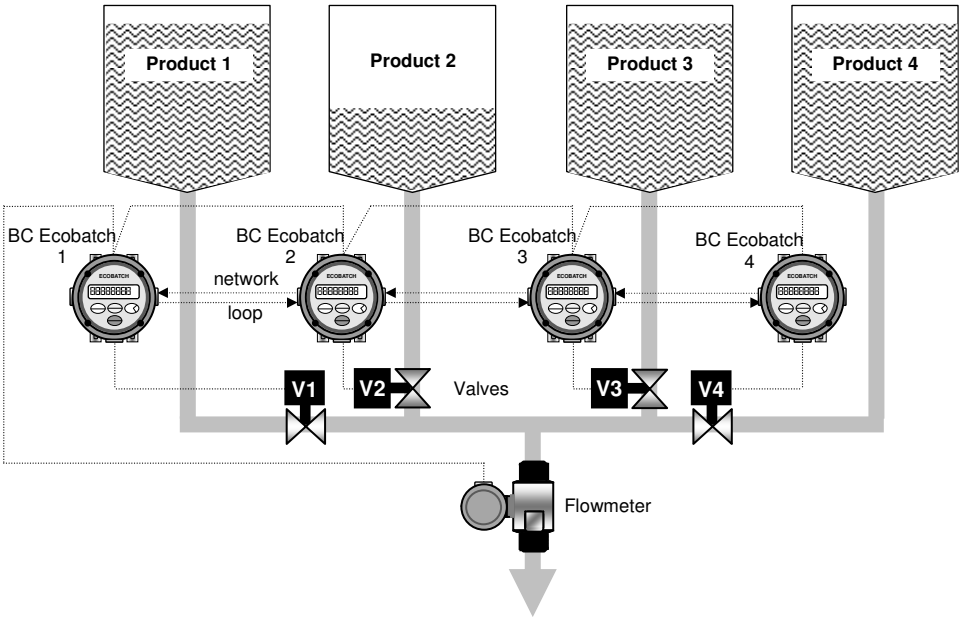
Network loop wiring



Multi point batching



Multi product batching



9. REFERENCE INFORMATION

9.1 *Program detail* *Pencil your program details here*

User selected PIN No.				
Engineering units				
K-factor (<i>scale factor</i>)	K =			
Decimal for batch total	<input type="checkbox"/> 000.	<input type="checkbox"/> 00.0	<input type="checkbox"/> 0.00	<input type="checkbox"/> .000
Decimal for Accum. total	<input type="checkbox"/> 000.	<input type="checkbox"/> 00.0	<input type="checkbox"/> 0.00	<input type="checkbox"/> .000
Count direction	<input type="checkbox"/> count DOWN		<input type="checkbox"/> count UP	
Start delay on relay 2	seconds			
Pre-stop value on relay 2				
Automatic overrun comp.	AOC	<input type="checkbox"/> yes	<input type="checkbox"/> no	
Missing pulse time-out	seconds			
Batch limit				
Unit ID number (1~9)	(0 = inhibit network function)			

9.2 Error messages: BC Ecobatch has a series of error messages which are scrolled across the LCD display when ever an error condition exists.

NO POWER

No power indicates that the instrument is on battery power only and needs to be supplied with an external power source in order to operate.

NO INPUT

No input (missing pulse detection) indicates that no pulses were received at the controller input within the time out period at any stage of the batch cycle. (see clause 4.9)

**BATCH VALUE EXCEEDS
BATCH LIMIT**

The new batch value will not be accepted because it exceeds the maximum batch limit value. (see clause 4.10)

**PRE-STOP EXCEEDS
BATCH VALUE**

The new batch value will not be accepted as it is less than the pre-stop value (clause 4.7)

WAIT

This message will show if the RUN button is pressed whilst the controller is in the process of assessing the degree of overrun from the previous batch when AOC is enabled.

9.3.1 *Back up PIN number* (see clause 4.1)

----- Cut from manual for increased security -----

Your back up 4 digit PIN number is 0502

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