INSTALLATION PROCEDURE

FOR THE INNOVEC IBL

POWERED

BATCH CONTROLLER

IBL BATCH CONTROLLER CALIBRATION PROCEDURE

Thank you for purchasing an Innovec product. The IBL is used for liquid flow batching to an accuracy of 0.001 litres. It displays the running total and background total during batching in either Batch Up or down modes on a 6 digit 18mm LCD display. The instrument is housed in a panel mounting enclosure measuring 144mm wide x 72mm high x 130mm deep (including rear terminal strip). The count values are stored in non-volatile eeprom memory for a minimum period of 10 years.
The instrument incorporates two counters, a six (6) digit running batch total which is normally displayed and a background totalisor (master total).
A user programmable K factor of eight (8) digits [00.000000] is incorporated which consists of two (2) whole numbers and six (6) decimal places.
The user can enter the configuration mode and enter:

- K factor
- Decimal point **[no dp, 0.1, 0.01 or 0.001]**
- Relay One turn off point (in Batch Up mode) or Relay One start point (in Batch Down mode)
- Relay Two turn on point and turn off point (in Batch Up mode) or Relay Two turn on point and turn off point (in Batch Down mode)
- End of batch delay with open collector output as 0.0 to 99.9 seconds
- Automatic over run compensation turn on or off for compensation in whole litres only [in Batch Up mode only, in Batch Down mode under development]

Run Functions:

- Total is displayed by pressing the DISPLAY (◄) button while in run
- MODE button displays Relay One turn off point (in Batch Up mode) or Relay One start point (in Batch Down mode)

The instrument also incorporates:

- Low flow alarm with open collector output
- Pulse per litre open collector signal output is available
- End of batch delay with open collector output

Step 1 - Panel Installation

The instrument is supplied in 144mm wide x 72mm high x 120mm deep aluminium enclosure with a sealed front plate, and is designed to be panel mount mounted with a panel cut out of 139mm wide x 66mm high. To mount, the instrument should be slid into the hole from the front and the 2 brackets fixed to the side, then tightened to hold the instrument firmly in place.
Please Note: A clear plastic boot is available to increase the weatherproof protection to IP67 which requires a slightly larger panel cut out size.

Step 2 - Electrical Connection

The instrument has been supplied with a two-part screw terminal for easier installation which has a ten (10) way plug for signal and a ten (10) way plug for power and output relay connection. **Before connecting power to the instrument always check the label for the supply the instrument has been configured for:**

For a nominal 240VAC operation, connect AC power to:

(a) Terminal 18 is VAC active supply (85 to 265VAC)
(b) Terminal 19 is neutral supply
(c) Terminal 20 is ground supply

Please note:

1. **We also recommend if DC solenoids are being used (these are normally 24VDC) the connection of a 1 amp silicon diode (part # 1N4004 to 1N4007) across the solenoid connections to reduce potential interference to the instrument (this has been supplied with the instrument). The diode should be connected with anode on the 24VDC supply and the cathode to the negative or load supply.**

For a nominal 24VDC (18-36VDC) operation, connect **DC** power to:

(a) Terminal 18 is 24VDC supply
(b) Terminal 19 is 0VDC supply
(c) Terminal 20 is ground supply

Before connecting power to the instrument always check the label for the supply the instrument has been configured for:

Step 2 – Input Signal Connection

- The instrument has an eight way DIP switch for input selection. The signal should be connected across terminal three (3) input (positive) and terminal (2) input negative.

Input Signal Used		Input Connection		Switch Settings Used for this Function							
		Channel One									
	Switch Number	+	-	1	2	3	4	5	6	7	8
A	CMOS Logic Signal	3	2	off	off	off	off	on	off	off	off
B	Open Collector or Reed Switch	3	2	off	off	off	off	on	off	on	off
C	Namur Proximity (set loop supply out to 8 volts)	8	3	off	off	on	on	on	off	off	off
D	Switch or Reed Switch with Debounce Circuit (200Hz max)	3	2	off	off	off	off	on	off	on	on
E	Coil (20mv P-P minimum)	3	2	off	on	off	off	off	off	off	off
F	Coil (low impedance 22mv pp minimum)	3	2	on	on	off	off	off	off	off	off

Switch #	1	2	3	4	5	6	7	8
OFF								
ON								

- CMOS Logic Signal – for vortex or magnetic flow meters
- Open Collector or Reed Switch – hall effect sensors or positive displacement flow meters with reed switch output
- Namur Proximity - positive displacement flow meters with 2 wire proximity output
- Coil (20mv P-P minimum) – millivolts signal from turbine meter

It is good practice to use shielded cables for all signal connections to the IBL Batch Controller. Care must be taken to separate signal cables from power cables so as to minimise interference.

Installation

Overall shields should be connected to the case earth at the instrument end only. This connection should be as short as possible and connected to the earthing terminal (Terminal 20).

In order to comply with the requirements for Electromagnetic Compatibility as per EMC-Directive 89/336/EEC of the Council of European Community, this

wiring practice is mandatory. Although it is also possible to connect shields to the signal ground (Terminal 1) this practice is not in accordance with EMC directives.

Step 3 – Start Batch Input Connection
The instrument accepts a clean contact (contact closure) input signal for Start Batch. This function is 24VDC tolerant and should be connected across **Terminal 4** and **Terminal 1.** (This is a duplication of the batch start push button on the front panel).
The Start Batch function energises Relay One, resets the batch counter to zero in count up mode and the batch counter to Relay One Set Point value in countdown mode.

Step 4 – Stop Batch Input Connection
The instrument accepts a clean contact (contact closure) input signal for Stop Batch. This function is 24VDC tolerant and should be connected across **Terminal 5** and **Terminal 1.** (This is a duplication of the batch STOP/PAUSE push button on the front panel).
The Stop Batch function halts the progress of the batch and de-energises both relays.

Step 5 - Reset Button Connection
The instrument accepts a reset from a clean contact (contact closure).
The background total can be reset to zero by a normally open push button connected across **Terminal 7** reset input and **Terminal 1** internal 0VDC. Holding this switch closed for a minimum of 5 seconds will reset the background total.

Step 6 - Using the 6 to 22VDC Loop Supply
The Loop Supply is a regulated output available on **Terminal 8**, but is limited to a current capacity of approximately 30mA. This supply is adjustable from 6 to 22VDC by a potentiometer adjacent to terminal at the rear of the instrument.

Step 7 – Pulse per Litre Output Connection
The instrument produces a pulse output for every litre measured. This signal is a 24VDC tolerant open collector transistor output and is found on **Terminal 9**. The standard procedure would be to connect a load across 24VDC power and **Terminal 9** as negative.

Step 8 – Low Flow Alarm Output Connection
The instrument produces an open collector output if no input pulses are received in pre-programmed period when the batch is running. This alarm also cancels the batch. This output signal is a 24VDC tolerant open collector transistor output, and is found on **Terminal 10**. This alarm works by turning on the output if no pulses are received in a user-programmed period of 0.1 to 99.9 seconds. The standard procedure would be to connect a load across 24VDC power and **Terminal 10** as negative.

Step 9 – End of Batch Delay Output Connection
The instrument produces an open collector output at the end of batch. It is programmable from 0.0 to 99.9 seconds. This signal is a 24VDC tolerant open collector transistor output and is found on **Terminal 11**.The standard procedure would be to connect a load across 24VDC power and **Terminal 11** as negative.

PLEASE NOTE: At any point during the programming cycle if you wish to save variables already entered press:

Stop / Pause

The instrument returns to Run mode and all variables are written to non-volatile memory. [It should be noted that in the programming mode if none of the buttons are pressed in a twelve (12) second period the instrument will revert back to Run mode without saving any variables to the non volatile memory.]

Step 10 - Instrument Calibration

All functions of the instrument are programmable from the eight (8) touch buttons mounted on the display circuit board.

▲(start)	◄(display)	Mode (batch set)	Prog/Run (stop/pause)

To enter Programming Mode press:

Display ◄

Then while holding down the DISPLAY button press:

Stop/Pause

The display shows:

ACCS (Access)

To enter Programming Mode, there is a simple access code. It is necessary to push in sequence:

▲ (start) BUTTON then ◄ (display) BUTTON then ▲ (start) BUTTON again.

▲	◄	▲

You are now in Programming Mode. The instrument displays:

DP

This is the **Decimal Point Position**. The decimal point can be adjusted for NO decimal point (00000000), one decimal point position (0000000.0), two decimal point positions (000000.00) or three decimal point positions (00000.000). Pushing the UP button will cause the decimal point to increment towards the left. If the UP button is being pushed the DP increments. If no changes are required or you have selected the required display decimal point position, please press:

Batch Set / Mode

To show:

Cal1

This is the **K Factor** that the instrument uses to calculate the flow in litres. Because the instrument has a six (6) digit display, and we use an eight (8) digit K Factor, the factor is **displayed as two four digit numbers**. Cal1 is displayed for approximately 3 seconds before displaying the 4 **most significant numbers** as NN.NN. To enter the K Factor, it is first necessary to calculate this value. (Note the K Factor is entered into the instrument as the reciprocal of the actual factor. Divide 1 (for one litre) by the calibration factor of your flow sensor. If your flow sensor has a factor of 7, then divide 1 by 7 = 0.142867. This is the factor you should enter.

Entering the Value
This can be ***changed by using the UP button to enter the value*** and ***the DISPLAY (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed, it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your K Factor value into the four available digits.

If no changes are required, or when you have selected the required K Factor, please press:

Batch Set / Mode

To show:

Cal2

This is the 4 **least significant** digits of the K Factor. Cal2 is displayed for approximately 3 seconds before displaying the 4 least significant numbers as NNNN. To enter the K Factor, it is first necessary to calculate this value. (Note the K Factor is entered into the instrument as the reciprocal of the actual factor. Divide 1 (for one litre) by the calibration factor of your flow sensor. If your flow sensor has a factor of 7, then divide 1 by 7 = 0.142867. This is the factor you should enter.

Entering the Value
This can be ***changed by using the UP button to enter the value*** and ***the DISPLAY (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing, and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your K Factor value into the four available digits.

If no changes are required, or when you have selected the required K Factor, please press:

Batch Set / Mode

To show:

BACH Up

This is the current method that the instrument uses when counting pulses from the flow sensor. In Batch Up mode, the count pulses up from zero to 999999. By pressing the UP button, the display will change to show:

BACH Dn

This is the current method that the instrument uses when counting pulses from the flow sensor. In Batch Down mode, the count pulses up from the Relay One Set Point to 0.

If no changes are required, or when you have selected the required time value, please press:

Batch Set / Mode

To show:

RLAY1 SP

This is the Relay One Set Point value. This is the value in Batch Up mode that Relay One will de-energize. This is displayed for approximately 3 seconds before displaying the actual Set Point value.

100.05

Entering the Value
This can be ***changed by using the UP button to enter the value*** and ***the DISPLAY (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing, and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your Set Point value into the eight available digits.

If no changes are required, or when you have selected the required value, please press:

Batch Set / Mode

To show:

REL2 DL

This is the Relay Two turn on delay. This is the timing value in Batch Up mode that will cause Relay Two to energize after that value has been exceeded. This value is programmable from 0 to 999.9 seconds. This is displayed for approximately 3 seconds before displaying the actual timing value.

10.00

Entering the Value
This can be ***changed by using the UP button to enter the value*** and ***the DISPLAY (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your Relay Two Set Point value into the eight available digits.

If no changes are required, or when you have selected the required value, please press:

Batch Set / Mode

To show:

REL2 SP

This is the Relay Two turn off value. This is the value in Batch Up mode that Relay Two will de-energize. This is displayed for approximately 3 seconds before displaying the actual Set Point value:

90.00

Entering the value

This can be ***changed by using the UP button to enter the value*** and ***the display (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing, and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your value into the eight available digits.

If no changes are required, or when you have selected the required value, please press:

Batch Set / Mode

To show:

EOBDL (End of Batch Delay) and a Value NNN.N

This is the End of Batch Delay value. This is the value in Batch Up or Down mode that is generated between batches. It has a value of 0.0 to 999.9 seconds.

Entering the Value

This can be ***changed by using the UP button to enter the value*** and ***the DISPLAY (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed, it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing, and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your value into the eight available digits.

If no changes are required, or when you have selected the required Set Point, please press:

Batch Set / Mode

To show:

LOFLO (Low Flow Alarm Timing Value) and a Value NNN.N

This is the Low Flow Alarm detection period value. This is the value in Batch Up or Down mode that is used if no pulses are received from the flow sensor during which time that batch will be cancelled, and the Low Flow Alarm output will be turned on. It has a value of 0.0 to 999.9 seconds.

Entering the Value
This can be ***changed by using the UP button to enter the value*** and ***the DISPLAY (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed, it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing, and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your value into the eight available digits.

If no changes are required, or when you have selected the required Set Point, please press:

Batch Set / Mode

To show:

LFLOFF

This is the Low Flow Alarm turn on and turn off sequence. By pressing the UP button the display will change to display:

LFLON

This is the Low Flow Alarm turn on and turn off sequence.
When you have made your selection please press:

Mode

To show:

AOC OFF

This is the AOC Function (Automatic Over Run Compensation) sequence. When this function is turned on, the Set Point value will automatically be adjusted if over run occurs in whole litres. This function only operates in Batch Up mode. By pressing the UP button the display will change to show:

AOC ON

This is the AOC Function (Automatic Over Run Compensation) sequence. This function only operates in Batch Up mode. If no changes are required, or when you have selected this function, please press:

Batch Set / Mode

To show:

DP

And you have returned to the beginning of the menu.

If you have finished configuring the instrument then press:

Stop / Pause

The instrument returns to Run mode and all variables are written to non-volatile memory.
[It should be noted that if none of the buttons are pressed in a twelve (12) second period, the instrument will revert back to Run mode without saving any variables to the non-volatile memory.]
If a mistake has been made you can cycle through the variables using the button marked:

Batch Set / Mode

RUN MODE FUNCTIONS

In Run mode, pressing the button marked:

Batch Set / Mode

Shows:

RLAY1 SP

This is the Relay One Set Point value. This is the value in Batch Up mode that Relay One will de-energize. This is displayed for approximately 3 seconds before displaying the actual Set Point value.

10.5

Entering the Value
This can be ***changed by using the UP button to enter the value*** and ***the DISPLAY (◄) button to select the digit to be changed***. ***The selected digit is flashing on and off***. Pressing the UP button causes the flashing digit to increment. If the UP button is kept pressed, it will increment from 0 to 9. When you have selected the number you want for that digit, press the ◄ button. This will cause the digit you have been incrementing to stop flashing, and the digit immediately to the left to start flashing. Use the UP button to then cause that digit to increment. This is the method used to program in your value into the eight available digits.

If no changes are required, or when you have selected the required value, please press:

Batch Set / Mode

Changing of values has finished. Pressing the MODE button writes the values to non-volatile memory. You are now ready for the next batch.

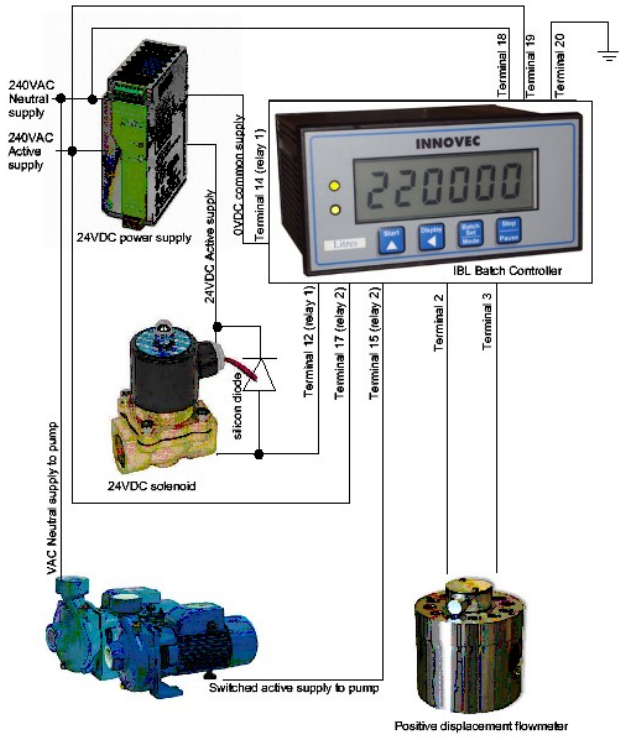
RUN MODE FUNCTIONS (2)
In Run mode, pressing the DISPLAY (◄) button will have the following result: the batch count on the LCD display will be replaced by the background total but only while the button is pressed.

Rear View of Instrument Screw Terminal Arrangement

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Terminal 1	Input common
Terminal 2	Input minus
Terminal 3	Input positive
Terminal 4	Start batch input
Terminal 5	Stop batch input
Terminal 6	Resume input
Terminal 7	Reset input
Terminal 8	8 to 20VDC loop supply
Terminal 9	Pulse per litre open collector output
Terminal 10	Low flow alarm open collector output
Terminal 11	End of batch open collector output
Terminal 12	Relay 1 normally open contact
Terminal 13	Relay 1 normally closed contact
Terminal 14	Relay 1 common contact
Terminal 15	Relay 2 normally open contact
Terminal 16	Relay 2 normally closed contact
Terminal 17	Relay 2 common contact
Terminal 18	85 to 265VAC / 24VDC active supply
Terminal 19	Neutral / 0VDC common supply
Terminal 20	Ground supply

Application Note 1: Batching System

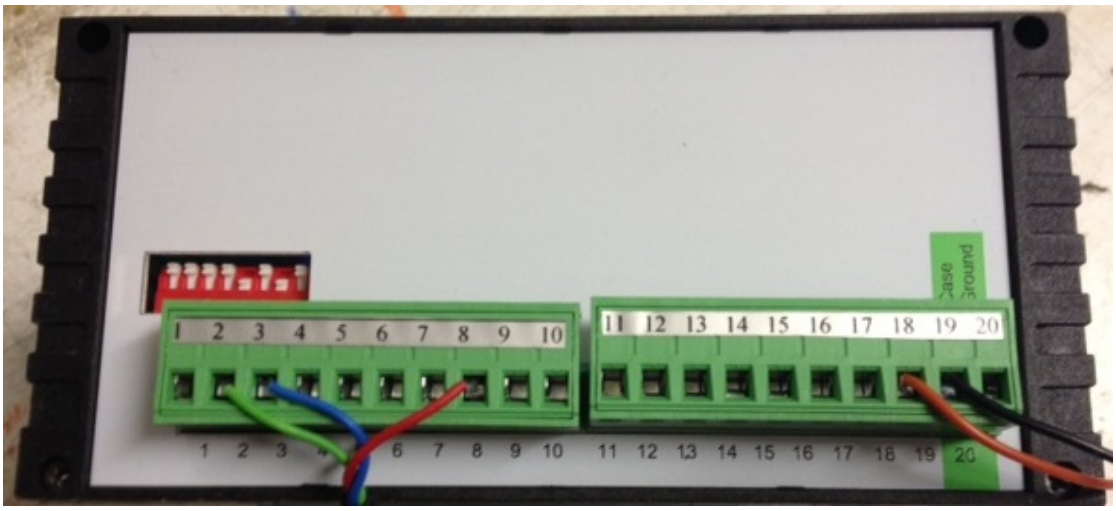


This is a batching system that comprises our IBL Batch Controller with a set point of 20 litres, single-phase 240VAC pump, 24VDC solenoid and positive displacement meter (PD Meter).

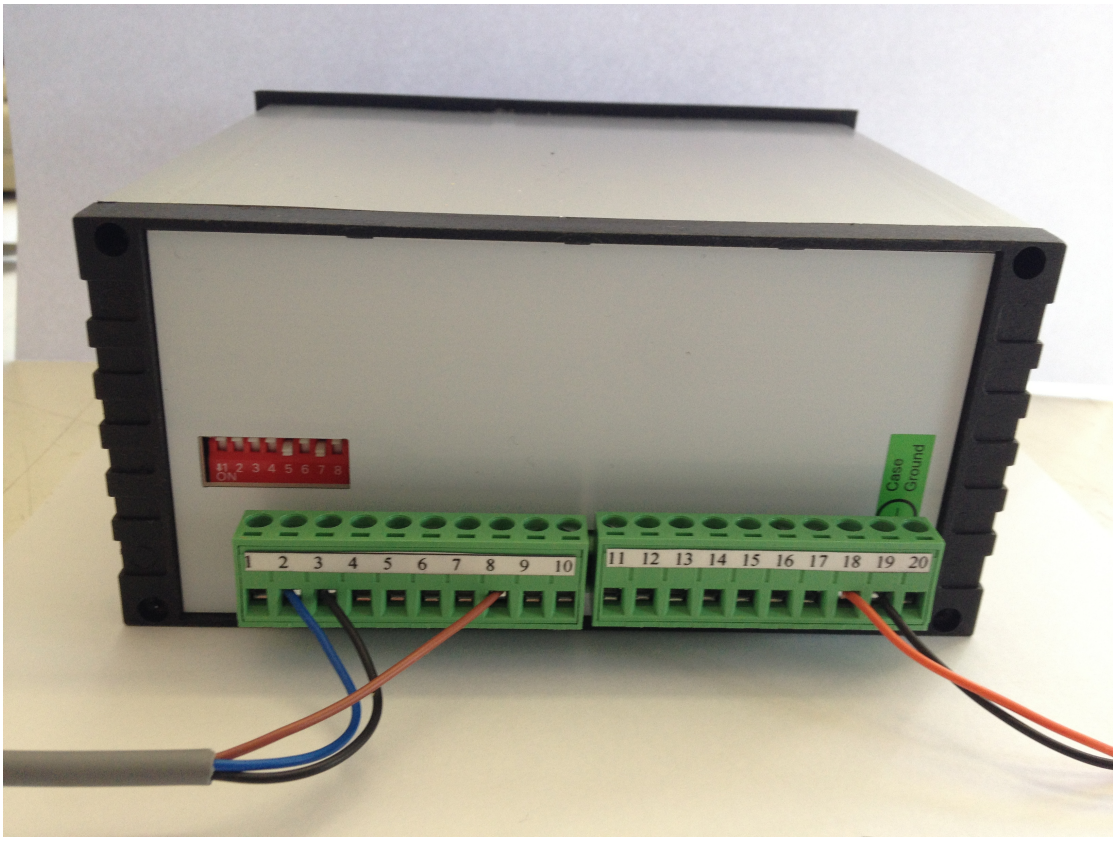
The IBL Batch Controller has a DIP switch selection for the input type that allows any standard flow meter to be used in an application. It also has two relays that can be used to drive pumps and solenoids. Relay One energizes at the start of batch and de-energizes at the end of batch. Relay Two has a programmable delay on start of 0.5 seconds (in this application) and can also be programmed to de-energise at the end of batch. It also includes an adjustable DC power supply of 8 to 24VDC with a capacity of 50mA to provide power to the flow sensor.

In the basic batching system shown here, using a PD meter with a reed switch output, connect the output signal to **Terminal 2** of the batcher (input minus) and **Terminal 3** of the batcher (input plus). The DIP switch should be set with switches 5 and 7 on and all other switches off.

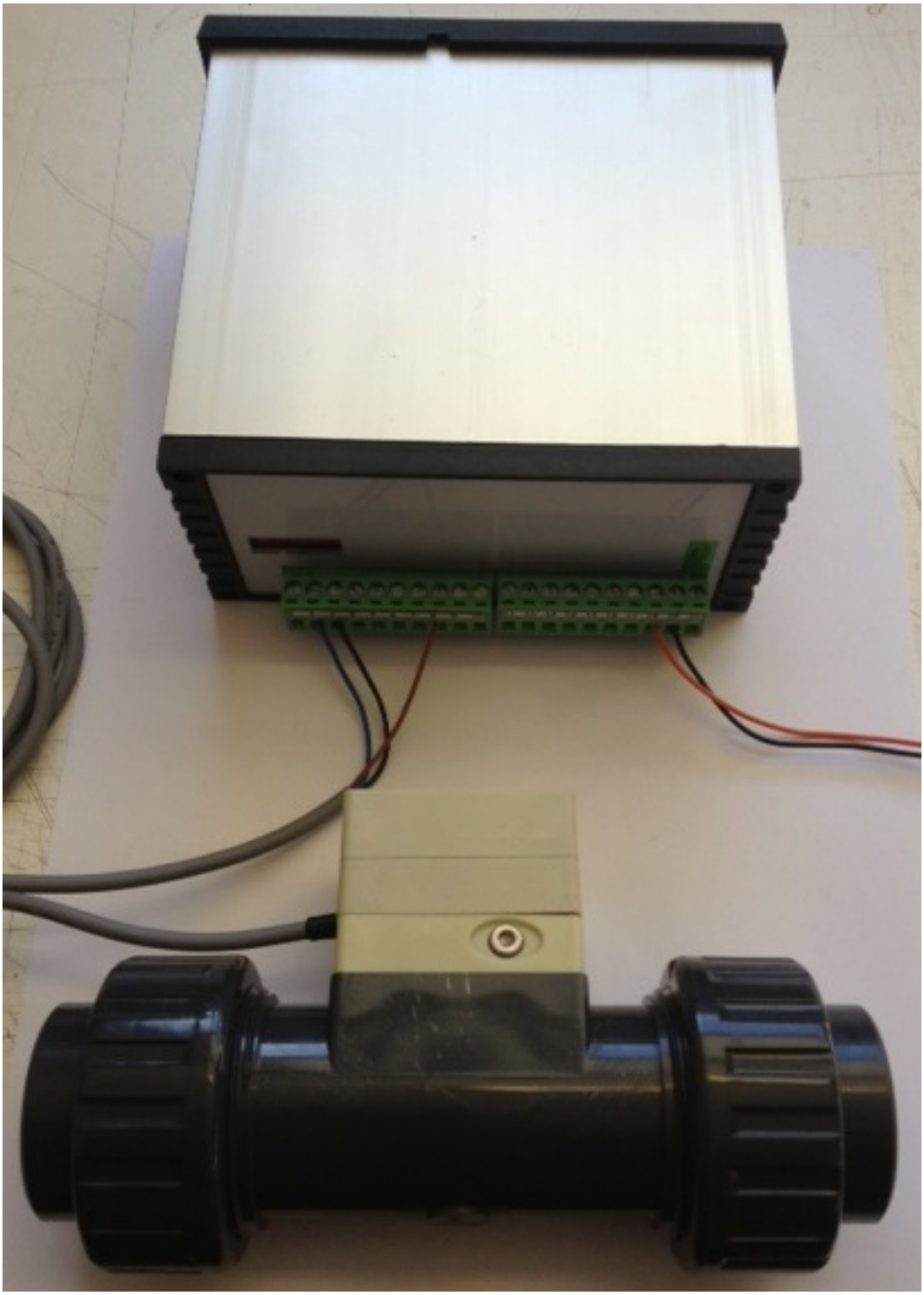
The 24VDC active supply is provided from an external 24VDC supply. It is connected to the positive terminal of the solenoid. Relay One through the common and normally open contact (**Terminal 14** & **Terminal 12** of the batcher) switches the 0VDC supply onto the solenoid, causing the solenoid to energise. The batcher has been programmed with a 0.5 second delay on Relay Two starting. After this time period, Relay Two energizes and switches 240VAC (through the common & normally closed contact (**Terminal 17** & **Terminal 15** of the batcher) onto the pump, causing the liquid to flow. The batching system continues until 20 litres have been delivered, at which point Relay One de-energizes turning off the solenoid and Relay Two de-energizes turning off the pump.
Please Note: It is a normal precaution when using DC solenoids that a 'fly wheel diode' is connected across the solenoid to prevent the generation of back EMF when the solenoid de-energizes. While a number of solenoid manufacturers incorporate this component in their product, it is a feature to consider in an installation.



IBL Batcher rear view with Titan Flow meter connections
Terminal 2 = green (0V), Terminal 3 = blue (signal+), Terminal 8 = red (+supply 12V)



IBL Batcher rear view with Fotek Flow meter connections
Terminal 2 = green (0V), Terminal 3 = blue (signal+), Terminal 8 = red (+supply 12V)



IBL batcher installation with Fotek KTW-25-P turbine flow meter