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❖ **Agriculture**

❖ **Cranes & lifts**

❖ **Refuse & Recycling**

❖ **Construction**

❖ **Off-Road vehicles**

❖ **Forestry, Wood & Pulp**

❖ **Reclamation & Salvage**

❖ **Oil Field & Sands**

❖ **Demolition Equipment**

❖ **Cooling Solutions**

❖ **Military Apparatus**

❖ **Specialty Use**

❖ **Remote Control**

❖ **Power Generation**

❖ **Emission Controls**

❖ **Integrated Drivers**

❖ **Valve & Pump Controls**

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www.hctcontrols.com

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For a full list of authorized distributors worldwide, please visit:

www.hctcontrols.com/distributors/index.htm

High Country Tek, Inc.
208 Gold Flat Court
Nevada City, CA, 95959
Tel: (1) 530 265 3236
Fax:(1) 530 265 3275

High Country Tek, Inc.

Electronic Valve Controller: evc-2
Open Loop control of single or dual coil valves, pumps & other equipment

Electronic Control Solutions for the Global Fluid Power Industry

High Country Tek, Inc. (HCT)

Introduces the **evc-2**, our latest cost effective and simple answer to your dual channel driver needs.

Individual control of two (2) directional proportional valves from one robust unit offers outstanding system value.

Use our **Free PC user set-up software** for quick, easy and accurate configuration of each channels settings for any OEM electro-hydraulic products.

Designed for use in extreme environments, fully sealed and complete with CE compliance makes this an attractive universal solution that can be easily used in mobile or industrial global applications.

evc-2 Product Features:

- Operates with all major OEM electro-hydraulic valve and pump equipment
- Dual channel open loop controller ready for voltage or mA analog command signals
- Sealed & protected to >IP68 (NEMA 6P)
- Environmentally hardened by 'Solid' potting with flame retardant materials
- SAE-J1939 & HCT-CAN communication protocols
- Full CE compliance for confident global application on all mobile equipment
- Patented **Intella™** system configuration software for fast implementation**
- Industry standard Cinch, Metripack Series 150 - 30 way connectors used
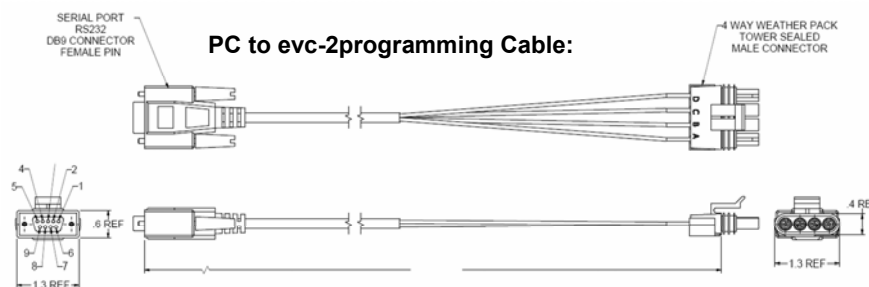- Comprehensive on-line literature, manuals, user guides and application information

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evc-2 Specification:

1. Module size/format: — High Country Tek Inc. proprietary format
2. Design Standards: — Full CE classification
3. Power Supply type and range: — 10 to 32VDC (max)
4. Recommended module protection: — 5A AGC fuse in power supply line
5. User stabilized voltage: — + 5VDC ±10%
6. Output current: — 500mA (max) - Current limited, short circuit protected
7. Analog Input number & type: — 2x Inputs / DC Volts or Current loop (mA)
8. Analog input values: — 0 to +5v or 0 to 20mA
9. Voltage Command I/P Impedance: — 10 KOhm
10. Current command shunt resistor value: — 100 Ohms
11. Global Enable / Dis-able input: — 1x ON/OFF - see note below
12. Global Enable / Dis-able values: — 0V to +V Power supply max - see note below
13. Digital input number & type: — 2x ON/OFF inputs / DCV - level shift
14. Digital input values: — 0V to +V Power supply max
15. Digital output number & type: — 2x High Side / ON/OFF level shift
16. Digital output values: — 0 to module supply voltage -0.5VDC
17. Digital output range: — 0 to 3 amp max
18. Proportional Output number: — 2x PWM
19. Proportional O/P Protection: — Open and short circuit protection
20. Proportional output range: — 0 to 3 amp max
21. Operating Temperature range: — -40C to +85C
22. Storage temperature range: — -40C to +100C
23. Ingress protection rating: — IP 69 / NEMA 6P
24. Connector type: — Cinch. Metri-Pack 150 series - 30 way male

REMOTE ENABLE Important Note:

- The Enable input is DIGI 1 (connector pin S2) and is configured to be active HIGH
- The user MUST pull the input 'S2' to +V supply to allow normal operation.
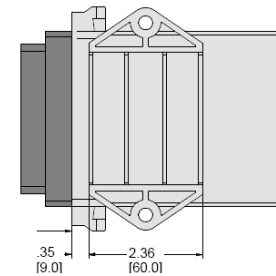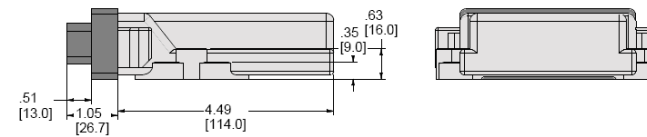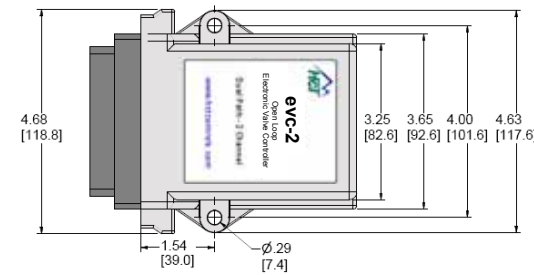- The enable input is failsafe, with the input pin 'S2' pulled LOW (0V) internally.

evc-2 accessories - PC set-up cables:

PC to evc-2 programming Cable:

SERIAL PORT RS232 DB9 CONNECTOR FEMALE PIN

4 WAY WEATHER PACK TOWER SEALED MALE CONNECTOR

HCT Part Number:
999-10075

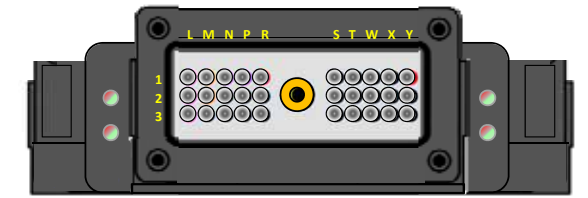## evc-2 Module Mechanical Details:

IMPORTANT NOTE:

Recommended tightening torques for the securing bolts are as follows:

For a 1/4-20 bolt, SAE Grade 5

DRY Torque: 8 Ft-Lbs
Lubricated Torque: 6.3 Ft-Lbs

evc-2 Module Connection Details:

View looking at module male 30 way connector

evc-2 Connector Designation Tables

30 Pin Metri-Pak Connector (Male, Plug)

PIN	Name	Function	PIN	Name	Function	PIN	Name	Function
L1	TXD	Transmit RS232 Data - Pin 'C'	P3	PWR COM	Channel #1 Command GND/0V	T3	DIG-3	Digital I/P #3 (Turns ON X3)
L2	RXD	Receive RS232 Data - Pin 'A'	R1	UNI-2	Channel #2 Command I/P	W1	PWM-1	Chanel #1 PWM O/P
L3	RTS	Request To Send - RS232 Pin 'D'				W2	PWM-2	Chanel #2 PWM O/P
						W3	HS-5	Digital O/P (from Digi 2 I/P)
M2	PWR COM	RS232 GND/0V	R3	+5V USER	+5V regulated user output	X1	HS-2	Channel #1 Coil B
M3	PWR COM	Channel #2 Command GND/0V				X3	HS-6	Digital O/P (from Digi 3 I/P)
			S2	DIG-1	Global Enable I/P			
N2	PWR COM	Ground / 0V / Signal Common	S3	DIG-2	Digital I/P #2 (Turns ON W3)	Y1	+PWR IN-1	+V Supply Power Input
N3	PWR COM	Ground / 0V / Signal Common	T1	HS-1	Channel #1 Coil A	Y2	+PWR IN-2	+V Supply Power Input
P1	UNI-1	Channel #1 Command I/P	T2	HS-3	Channel #2 Coil A			

999-10076 Connector Details

RS232 (PC) to evc-2 Communication Cable

| evc-2 PIN	Name	Function	999-10076
L1	TXD	Transmit RS232 Data - Pin 'C'	C
L2	RXD	Receive RS232 Data - Pin 'A'	A
L3	RTS	Request To Send - RS232 Pin 'D'	D
M2	PWR COM	RS232 GND (0V)	B

evc-2 LED operation and description:

LED 1:

- OFF = NOT Used in this application

LED 2: Output 1 or Output 2 (Red / Green):

- The LED will change from Red (0%) to Green (100%) through Yellow (50%), to indicate the duty cycle status of the corresponding output.

- OFF = NO PWM outputs are active
- Blinking Green = PWM Output 'Open Circuit' detected
- Blinking Red = PWM Output 'Short Circuit' detected
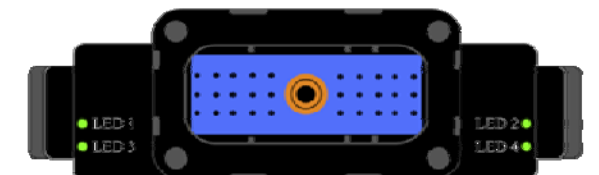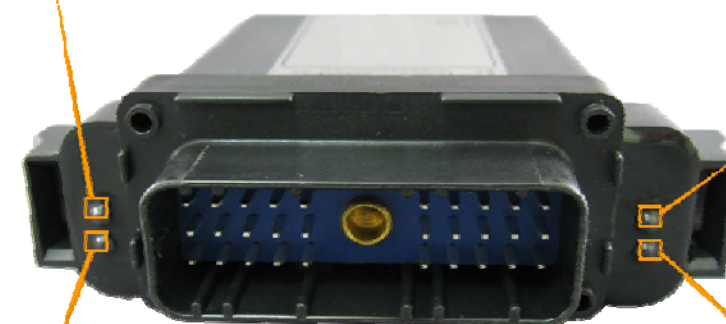
LED 3: (MS) - Module Status (Red / Yellow / Green):

- OFF = No power applied to module.
- ON Green = Module operating normally
- ON Red = Module has unrecoverable fault detected – contact factory
- Flashing Red = Low supply voltage (<8.5VDC)

LED 4: Status Indicator (Red / Yellow / Green):

- This indicator is programmable and can be used by the application code to show fault codes or display system operational conditions etc.

- Off = NO Errors / faults detected
- ON Red = PWM1 Open or Short circuit detected
- ON Green = PWM2 Open or Short circuit detected
- Blinking Yellow = High Side Open or Short circuit detected
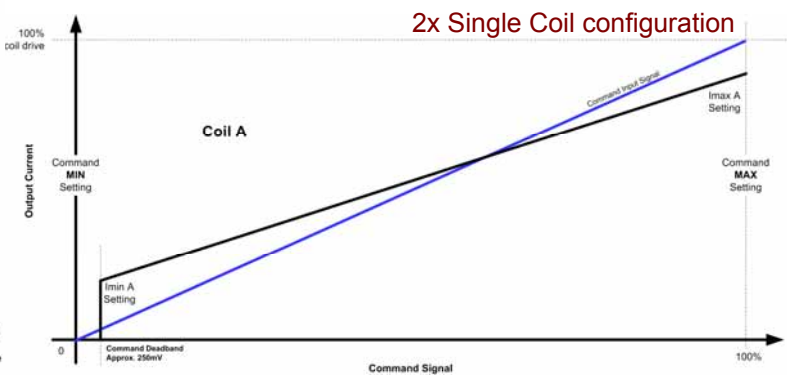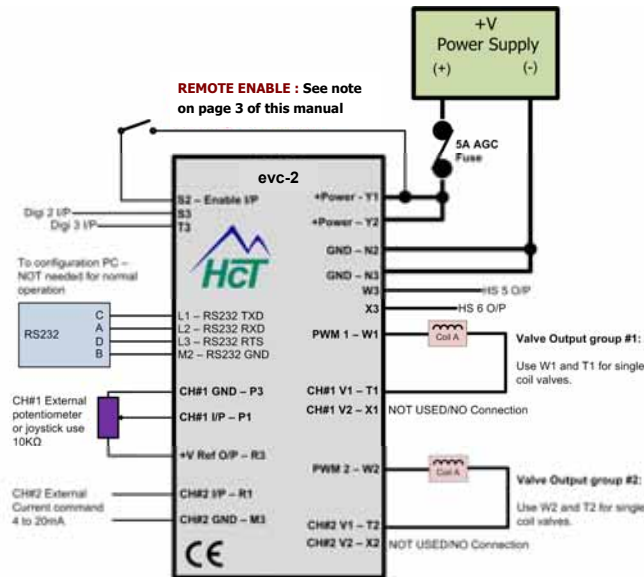- Blinking Red = User programmable / defined fault blink codes

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evc-2 additional ON/OFF control features:

To allow low level signals to drive high current loads (i.e. lamps/alarms) , the application provides 2 extra ON/OFF drives for convenience:

Digi 2 (Connector pin S3) is internally connected to HS 5 (Connector pin W3)
Digi 3 (Connector pin T3) is internally connected to HS 6 (Connector pin X3)

Dual Path with Single coil connections and applications:

2x Single Coil configuration

Configuration shown using 1x potentiometer or joystick with internal regulated +5V and 1x externally provided 4-20mA command input to control 1x valve coil per channel.

This option allows each input to control one output channel and take full advantage of the 10 bit (1024 steps) resolution offered by the evc-2 controller.
The dead band is internally set to approx. ±5% of the chosen command, shown here at 250mV for a 5V input and is to allow for any mechanical wear, tolerance or movement in the command potentiometer or joystick. When using 4 to 20mA, the deadband is still ±5% which equates to approx 0.8mA

Dual Path with Dual coil connections and applications:

2x Dual Coil configuration

Configuration shown using 1x potentiometers or joysticks with internal regulated +5V and 1x externally provided 4-20mA command input to control 2x valve coil per channel.
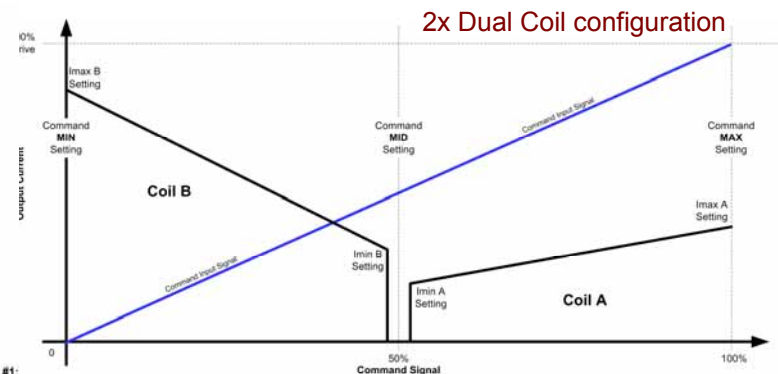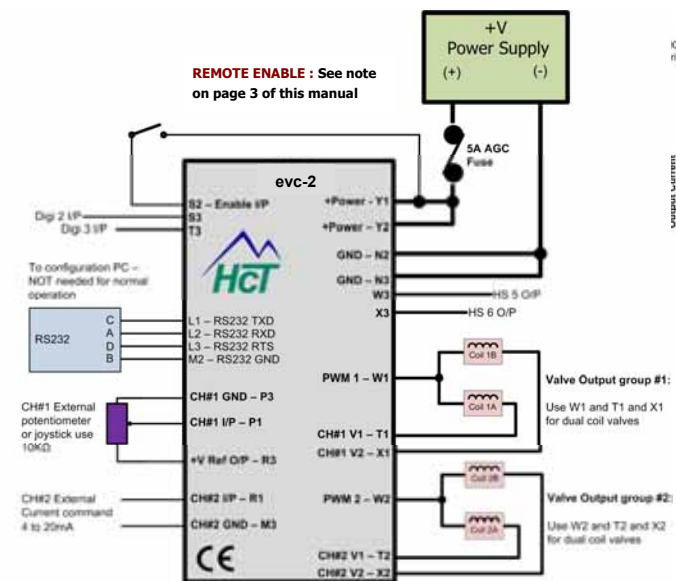
This option allows each input to control one output channel but *two valve coils*. The input command signal is configured such that at ~mid-value, both coils are OFF. The command dead-band is internally set to ±5% as before and as soon as this level is seen, the output immediately jumps to the relative Imin setting and smoothly proceeds from there to Imax for max command.
Coil A command is from ~mid value to +max value (i.e. 2.5V to +5VDC) while Coil B command is from ~mid value to +0 value (i.e. 2.5V to 0V).

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Dual Path / Channel applications:
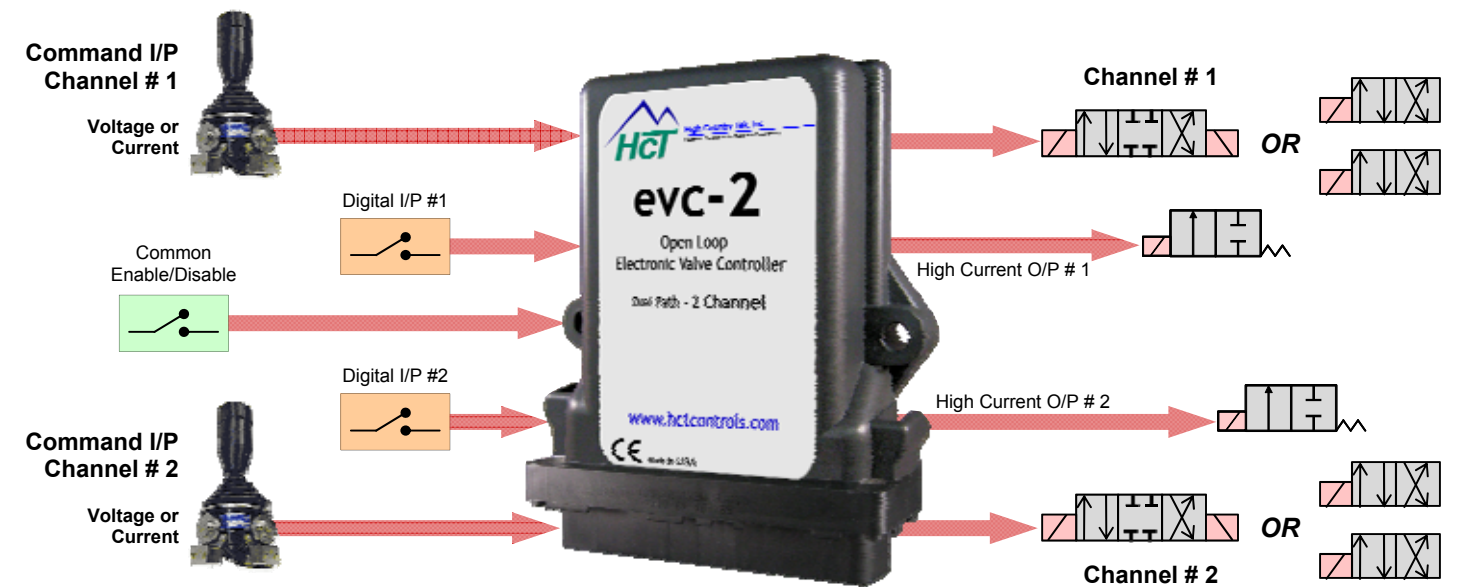
Dual Path evc-2 Graphical User Interface (GUI) Guide:
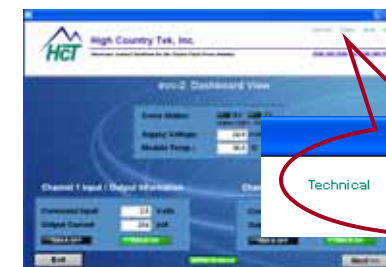
Click the following for these functions:

Technical:
This will open a PDF version of this manual that is installed with the Graphical User Interface software so it is available as a reference at all times.
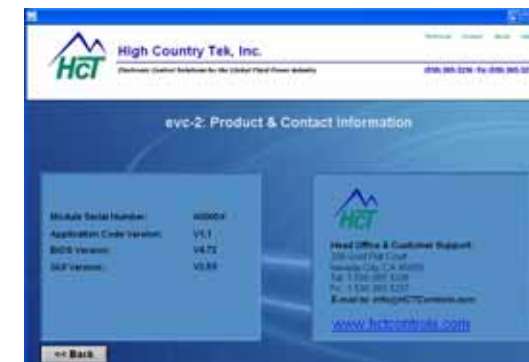
Contact:
This opens the users E-mail program and enters the HCT address and subject ready for the user to communicate and send whatever information required to HCT.

About:
Opens the GUI page displayed below, giving important information on the module and versions of software that may be needed during any conversations or E-mail with HCT technical or field support personnel.

Help:
This opens a PDF document on the evc-2 going into more details on the programming that the user can utilize to modify this original application software program if required (GUI will NOT reflect any user changes made)

The '**Miscellaneous Information'** page shows the module serial number as well as all versions of the software and GUI being used. This information may be asked for by HCT support personnel during any contact you require for help and guidance e.t.c.

The other information shown on this page is the HCT mailing address and also the direct E-mail to our customer support group.

There is also a live link (if PC is connected to the Internet) to the HCT website where extra information as well as the latest literature and product details can be found as required.

Clicking the 'Back >>' button will take the user to the previous screen.

evc-2 Graphical User Interface (GUI) Guide:

1. Install the **evc-2** Graphical User interface program onto Windows O/S PC or laptop or TekBook by following on-screen instructions.
2. Connect evc-2 controller to suitable power supply.
3. Connect RS232 communications cable to evc-2 and Windows PC noted in 1.
4. Locate the program in the 'START' menu and click to open the program.
5. Once communication has been established, the program will open with the screen shown to the left and attempt to make communications with the evc-2 module.

NOTE:
As required, messages will be displayed to alert the user to issues or items that need attention. Typically GREEN message backgrounds are good while bright RED should be taken as a warning or notice of a setting or state that could need attention.

This screen is intended to give the user a '**Dashboard**' overview of the controller settings in one easy to read screen.

The 'command input' and 'output current' for each channel can be seen while also observing the status of the RS232 communications between the PC and the module.

Top right of the screen is also a display box for the module supply voltage and actual internal temperature reading displayed in real time.

Clicking the 'Next >>' button will move the user to the next screen or clicking 'Exit' will close the interface and return the user to Windows desktop.

The **'Configuration Page'** shown here, allows the user to set the basic input command type to either DC Voltage (0 to +5VDC) or to Current (4 to 20mA) and how many coils will be connected to each output.

This process is important as selecting the single coil output type will scale the 0 to 100% command input across only one output while selecting a dual coil output type will split the command across coil A and Coil B, effectively halving the command resolution.

Clicking the 'Next >>' button will move the user to the next screen or clicking '<< Back' will take the user to the previous screen.

The '**Fine Tune Page'** offers the user options to customize each channel and to ensure that the valve or pump being controlled, acts as desired and is optimized.

As long as the user is connected to a evc-2 module, any changes made here are transmitted immediately to the module and will change the characteristic in the non-volatile memory updating the settings and making them the new levels even after power ON/OFF, so care should be taken to make small changes while also making sure that the correct parameter is being altered.

User editable value box's have a blue background with yellow text. Each window has 'min' and 'max' limits pre-set so prevent the user from entering a value that may cause issues.

Clicking the 'Dashboard' button will move the user back to the observation screen or clicking '<< Back' will take the user to the previous screen.

evc-2 Graphical User Interface 'Fine Settings Page' Guide:

1. **Channel X coil 1A Imin Out Current (mA):**
   This is the minimum current value that that will be sent to valve coil 1A when the command signal is approximately ± 5% of 2.5V (~125mV)

2. **Channel X coil 1A Imax Out Current (mA):**
   This is the maximum current value that that will be sent to valve coil 1A when the command signal is at approximately ±100% i.e. 0% command = Coil B at 100%, 50% command - Both coils OFF, 100% command = Coil A at 100%.

3. **Channel X coil 1B Imin Out Current (mA):**
   Same function and action as noted in item 1. above

4. **Channel X coil 1B Imax Out Current (mA):**
   Same function and action as noted in item 2. above

'Fine Tune' page in PC user interface program

5. **Channel X coil 1A Ramp UP time (Seconds):**
   This is the total time taken for the relative output current to go between the Imin and Imax settings for a 0% to 100% command input.
   The time is scaled for 0 to 100% command meaning that if the command goes from 50% to 100% the time taken will be 50% of the seconds set.

6. **Channel X coil 1A Ramp DOWN time (Seconds):**
   This is the total time taken for the relative output current to go between the Imax and Imin settings for a 100% to 0% command input.
   The time is scaled for 0 to 100% command meaning that if the command goes from 100% to 50% the time taken will be 50% of the seconds set.

7. **Channel X coil 1B Ramp UP time (Seconds):**
   Same function and action as noted in item 5. above

8. **Channel X coil 1B Ramp DOWN time (Seconds):**
   Same function and action as noted in item 6. above

9. **Channel X Dither Amplitude (0-100%):**
   This is the level of 'Dither' signal applied to the output current as a fixed percentage - i.e. if you set 50% here, the amplitude will be ratiometric over the entire PWM output range of 5 to 95 PWM.
   Valve OEM's usually recommend a % level here If no information is available, set to 30% for initial trials and optimize at later stage if needed.

10. **Channel X Dither Frequency (Hz):**
    This is the 'Dither' frequency that will be on the PWM output. Again, Valve OEM's usually recommend frequency here, if no information is available, initially set 150Hz for cartridge and smaller valves and 100Hz for larger industrial valves.

11. **Channel X Command Min:**
    Value sets the Max command input allowed

12. **Channel X Command Mid:**
    Value sets the Mid command for changeover in dual coil mode, ignored for single coil mode

13. **Channel X Command Max:**
    Value sets the Mid command allowable

Parameter	Max Value	Min Value	Action	Text
Channel 1 coil 1A Imin out current	3000mA	0mA		
Channel 1 coil 1A Imax out current	3000mA	0mA		
Channel 1 coil 1B Imin out current	3000mA	0mA		
Channel 1 coil 1B Imax out current	3000mA	0mA		
Channel 1 coil 1A Ramp up	65 sec	0sec		
Channel 1 coil 1A Ramp down	65 sec	0sec		
Channel 1 coil 1B Ramp up	65 sec	0sec		
Channel 1 coil 1B Ramp down	65 sec	0sec		
Channel 1 coil 1A Dither Amp	10% -100% in 10% increments			
Channel 1 coil 1A Dither Freq	33,45,50,55,76,10 0,125,142,200, 250, 333 & 500 Hz			
Channel 1 Command Min	5.0V	0V	Limits Input to 5v	
Channel 1 Command Mid	5.0V	0V	RED Warning box	out of range
Channel 1 Command Max	5.0V	0V	RED Warning box	out of range

Table guide showing user interface alarm annunciations and Max values or increments for various set-up parameters