

## Instruction, Installation and Operation Guide for:

# HAU Series Controllers



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## HAU – Single Coil Proportional Valve Driver

### Description:

The HAU Valve Driver is a single coil proportional valve driver that provides precise control of a single coil proportional valve by controlling current through Pulse Width Modulation.

The HAU will accept control inputs of –5V to +5V, 0 to +10V, 4 to 20 mA or an external potentiometer.

It will accept power supply voltages from 11 to 30 volts DC and is able to drive coils with requirements up to 5 amps.

Options include ramping, dither, waterproof potentiometers and WeatherPack connectors.

### Indicators:

PWR LED – Lights when the power supply voltage is above 10.5V.  
The unit will not function correctly if this lamp is off or blinking.

PWM% – Indicates the duty cycle to the coil by going from RED (full off) to GREEN (full on). The ratio of red to green gives a relative indication of current flow through the coil as an aid to tuning and troubleshooting.

### Wiring:

Hook up the unit as shown in Figure 2, using only one of the three control input configurations. Use 16 AWG wire for power and coil wiring. Use shrouded coil connectors. Locate the fuse as close to the power supply as possible to protect the wiring and the valve controller.

### Fusing:

Use only an ACG-5 fuse for current ranges up to 3.33 amps, or an ACG-10 fuse for 3.34 to 5.00 amp coils.



**Failure to properly fuse the unit invalidates the warranty.**



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## Setup Procedure:

Compare the part number on your unit to the Part Number Index in Figure 1 for an explanation of options specific to your unit.

This controller is best adjusted by observing the system response.

Coil current can be used, but coil voltage is not accurate.

## **INITIAL SETUP:**

1. Turn the MAX pot 10 turns CCW then 5 turns CW (set to center of pot)
2. Turn the MIN pot 10 turns CCW (off)
3. Turn all RAMP pots 10 turns CCW (off)
4. Turn the DITHER AMP pot 10 turns CCW (off)

## **MAX / MIN:**

1. Turn on power supply.
2. Set the control input to its minimum and adjust the MIN pot for the desired response. CW for more current, CCW for less. Set the control input to its maximum and adjust the MAX pot for the desired maximum desired response. Do not adjust the unit for more current than is required to fully shift the valve; this reduces the useful range of the controller and may harm the coil.
3. The Min and MAX pots interact with each other and system response may change as the system warms up. Warm the system to normal operating temperatures and repeat steps 2 and 3 until both the MIN and MAX pots are adjusted properly.

## ***RAMP Adjustments (Optional):***

If the unit has one ramp potentiometer it will adjust the ramping function for both directions of control to the same setting.

If the unit has two ramp potentiometers, RAMP UP will adjust the ramp time for current increases and RAMP DOWN will adjust for decreases in current.

Ramp is adjusted by quickly switching the control input from minimum to maximum, or maximum to minimum and adjusting the corresponding potentiometer to obtain the desired speed of response.

***NOTE: CW adjustment of the potentiometers will increase the ramp time.***

## ***Dither Adjustments (Optional)***

### **DITHER AMP:**

The dither amplitude potentiometer is set fully CCW (off) at the factory.

Once the valve being driven is established, adjust the potentiometer CW increasing the dither amplitude until the desired level is reached then readjust the MAX and MIN potentiometers.

### **DITHER FREQ:**

The dither amplitude may be pre-defined at time of order and if not, the frequency will be factory set to 140Hz.

If the valve is changed or a different dither frequency is needed, adjust the potentiometer CW, increasing the frequency until the desired level is reached.



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## **Troubleshooting:**

If the set up procedure does not achieve the desired results, double check the wiring and perform the following tests. Record the test results.

### ***Tools required:***

A battery operated multi meter and a small screwdriver are required.

### ***Check the power input:***

The card will not function correctly unless the +POWER to PWR COM voltage is at least 11 V. If this voltage is more than 30 V the card may be damaged.

### ***Check the control input you are using:***

#### **Potentiometer input:**

Measure the wiper voltage between the VOLT and SIG COM terminals. With a 10 K ohm potentiometer, the wiper will go from 0 (minimum current) to 9 V. The difference in voltage should be more than 5 V from minimum to maximum. The voltage must not be less than 0 V or more than 10 V.

#### **Voltage input:**

The difference in voltage between the VOLT and SIG COM terminals should be greater than 5 V from minimum to maximum. The voltage must not be less than -5 V or more than +10 V.

#### **Current loop input:**

Measure the current into the CUR terminal. The difference in current should be at least 10 mA from minimum to maximum. The current must not be negative or more 20 mA. If a current meter is not available, measure the voltage from the CUR terminal to the SIG COM terminal and divide by 150 for an approximate reading.

***NOTE: Only one control input at a time may be connected.***

#### ***Verify the coil is not shorted:***



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If the +COIL to -COIL terminals are shorted, the valve driver will shut down its output until the short is removed.

Disconnect the wires going to the +COIL and -COIL terminals and measure the resistance between the wires to ensure the coil is in good condition and within resistance range given by the manufacturer

## ***Check the card at full on & full off:***

**NOTE: Do not try the full on test if the power supply is 50% higher than the coil's rated voltage.**

Temporarily disconnect all wires from the 'VOLT' and 'CUR' inputs.

To test the card at full on, turn the MAX and MIN potentiometers 10 turns CW and temporarily connect the 'VOLT' and 'REF' terminals.

Measure the voltage from '+COIL' to '-COIL' and from '+POWER' to 'PWR COM'.

The voltage difference should be no more than one volt if the card is operating correctly.

To check the card at full off, disconnect the 'VOLT' and 'REF' terminals and turn the MAX potentiometer 10 turns CW and the MIN potentiometer 10 turns CCW.

The +COIL to -COIL voltage should be zero.

## ***If the valve won't fully shift:***

If the card passes the "full on test" above, the problem maybe in the electrical system.

Command the valve to full output.

Measure the modules supply voltage at the main DCV power supply or battery source and then measure the voltage across the controllers +PWR and GND terminals.

Compare these readings, they should be within 0.5V of each other, If there is excessive voltage drop in any of those wires i.e. >1V, they should be shortened or replaced by bigger wires.

Bad frame 0V (GND) connections can cause large voltage drops and operational interruption.

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When the coil heats up in use, it increases its resistance.

Most coils will still be able to draw sufficient current to fully shift the valve if their rated voltage is supplied to the card and the card on maximum output causes less than 1V drop.

When this is not the case, you must use a coil rated for less voltage or increase the power supply voltage.

The card will have no trouble driving a 12 V coil from a 24 V supply, or a 10 V coil from a 12 V supply for example.

You may need a new controller if the new coil draws more current than the controller is able to supply, based on the current range decided when ordered.

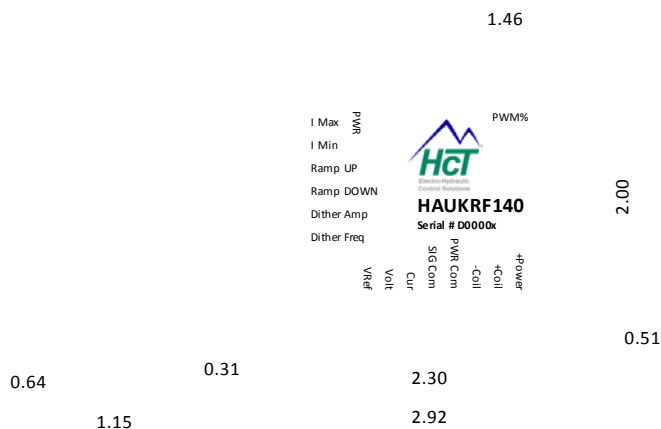
### ***If the valve shift is erratic:***

Electrical interference on the command signal control lines can cause erratic behavior if it is strong enough i.e. high wattage CB or Walkie-Talkie being used near the installation.

Try changing the routing of the control wires to see if the problem changes.

Power supply interference or brown outs can also cause erratic behavior. Test for this by running the card off its own fully charged battery.

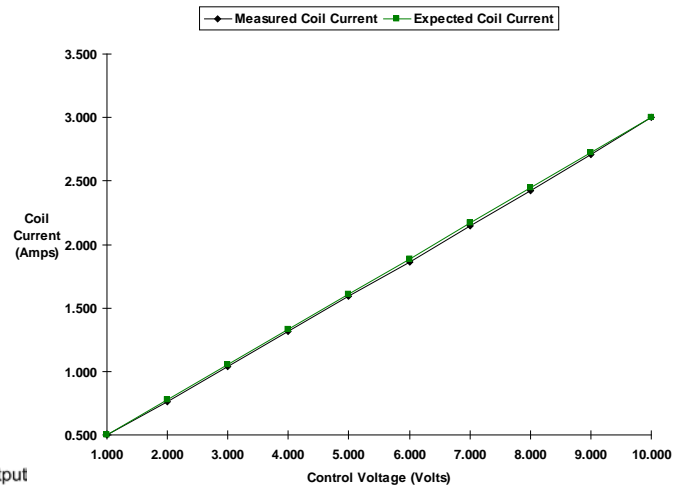
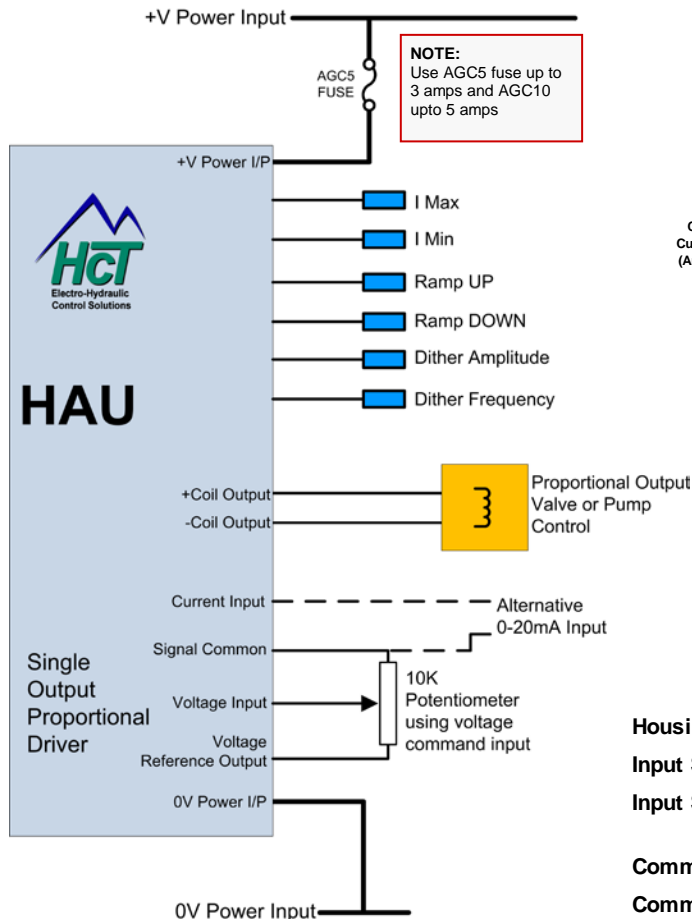
### **Controller Mechanical Details:**



### **Notes:**

- All dimensions in inches
- Unit weight is approx. 350 grams
- Mounting is via 3 x No. 8 holes ( 4.5mm ) on to flat surface
- Unit shown with ALL potentiometers possible
- ALL potentiometers are 10 turn variety with end 'clutch'

## Controller Connection Information:

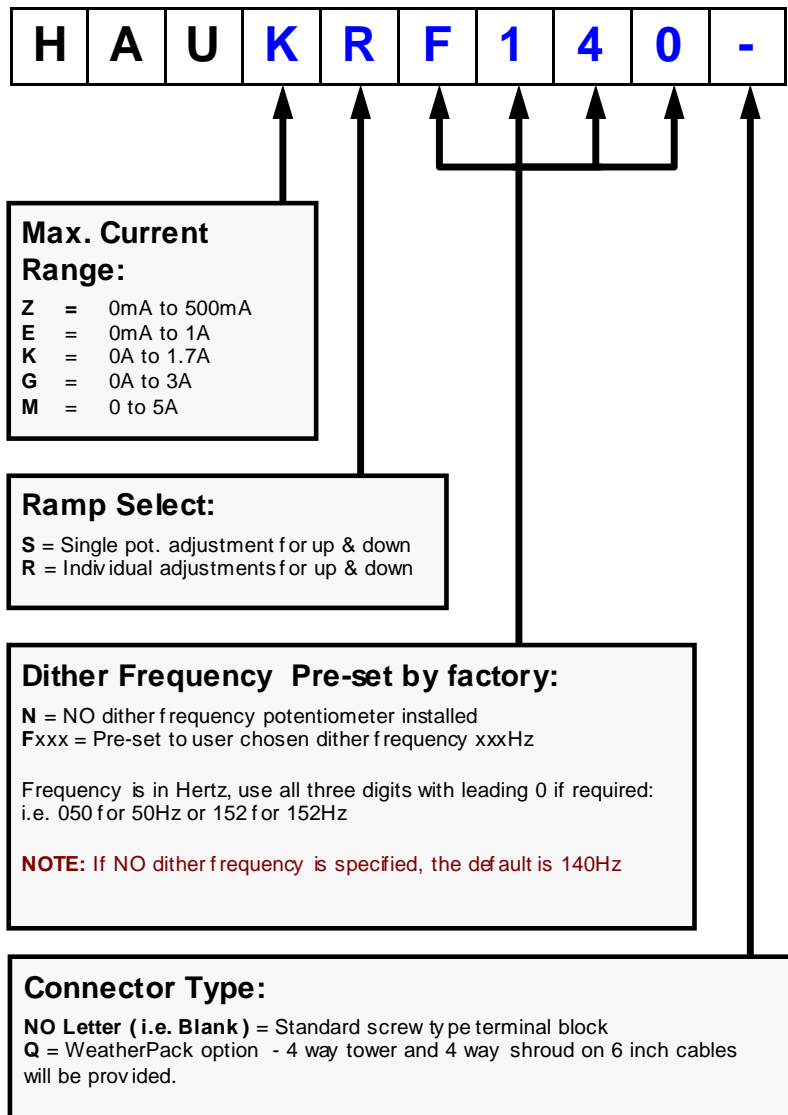


The HAU series of controllers has a very linear command input to current output curve to ensure the best flow or pressure characteristic is achieved from the product being driven.

<b>Housing Type:-</b>	HCT unique 'encapsulated' block.
<b>Input Supply Voltage:</b>	11 – 30VDC ( Absolute Maximum )
<b>Input Supply Current:</b>	Valve Current Setting + 200mA Quiescent (Max)
<b>Command Input Type(s):</b>	Voltage *Vdc) OR current (mA)
<b>Command Input Value(s):</b>	0 to +5V, 0 to +10V or 0 to 20mA
<b>Proportional Output:</b>	1x PWM up to 5A max current
<b>Dither Frequency :</b>	~30 to 200Hz ( adjustable )
<b>Dither Amplitude:</b>	~0 to 100% ( adjustable )
<b>Housing Material:-</b>	Black, Polycarbonate potting case
<b>Wire Connections :-</b>	8 way Terminal block with Weatherpack connectors as 'Q' option
<b>Connector type :-</b>	Screw terminals ( standard )
<b>Encapsulation:-</b>	Flameproof, 2 part epoxy resin - black
<b>Mounting:-</b>	3 x No. 8 ( 4.5mm ) screws .
<b>Temperature range:-</b>	-20 to +60°C ( operational )
<b>NEMA/IP Rating:</b> ( Module only )	NEMA 6P/68 derate for connector as required.



## Key Code Ordering Information:



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- ❖ Mining & Exploration
- ❖ Agriculture
- ❖ Cranes & lifts
- ❖ Refuse & Recycling
- ❖ Construction
- ❖ Off-Road vehicles
- ❖ Forestry, Wood & Pulp
- ❖ Reclamation & Salvage
- ❖ Oil Field & Sands
- ❖ Demolition Equipment
- ❖ Cooling Solutions
- ❖ Military Apparatus
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- ❖ Integrated Drivers
- ❖ Valve & Pump Controls



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