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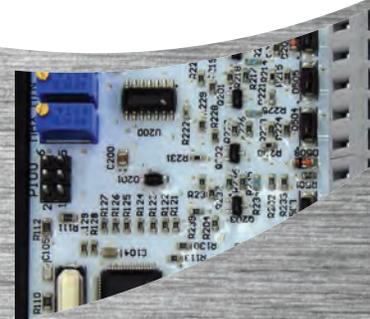
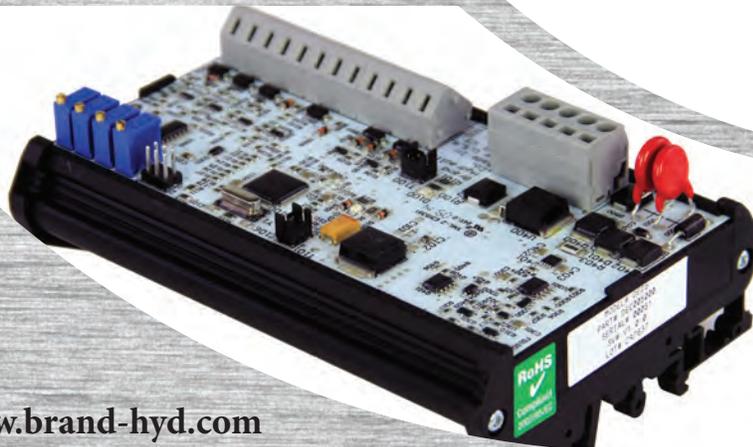
Engineering & Manufacturing Solutions

# Digital Interface Card

DEC005000

## APPLICATION:

The DEC005000 conveniently interfaces industry standard signals 4-20mA, 0-5V or 0-10V with a proportional solenoid valve



ISO 9001:2008 WITH DESIGN  
Certificate #02.002.1



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# DEC005000

Digital Interface Card

## FEATURES:

- Din rail mount, Din35 and Din 32.
- Reverse polarity protection.
- Active, short circuit monitoring and lockout.
- Open load detection.
- Diagnostic indicator.
- Pulse Width Modulated Output.
- Current controlled output, maintains output current regardless of supply voltage and coil resistance variations.
- Capable of accepting four industry standard signal types: Potentiometer, 0-10V, 0-5V, or 4-20mA.
- Reference voltage provided for control via an external potentiometer.
- Two Enable lines are provided, one with adjustable soft stop, both with adjustable soft start. (See details on page 4)
- Independent ramp adjustments up and down (0.1 -30s).
- Maximum and minimum current adjustments completely independent of one another.
- Wide voltage supply range (9-30V) for 12V or 24V systems.
- Full, industrial temp spec (-40°C - 85°C) operation.



## DESCRIPTION:

The DEC005000 has been designed to meet the various requirements of mobile and industrial hydraulic control applications. DEC005000 cards are versatile, cost effective and easily integrated into new or pre-existing designs. Much of this is a result of the unique ability each card has to accept 4 different signals. The DEC005000 can accept any of the following input types: Potentiometer, 0-10V, 0-5V, or 4-20mA. The card takes these signals and converts them into a PWM output suitable for a Brand EFC-Series valve or other proportional valves that meet the proper specifications.

## SPECIFICATIONS:

Voltage Supply	9-30 VDC
Operating Temperature	-40°C - 85°C (-40°F - 176°F)
Storage Temperature	-40°C - 85°C (-40°F - 176°F)
Max Continuous Output Current	3.0 Amps
Overcurrent Lockout Current	4.5 Amps
Short Circuit Lockout Current	5.0 Amps

Output Type	PWM , Pulse Width Modulation, 0-100% Duty cycle
PWM Output Frequency	30Hz - 500Hz +/- 5 Hertz (Factory Set)
Weight, fully assembled	0.151kg (0.332lb.)
<b>INPUT SPECIFICATIONS:</b>	
Potentiometer	Terminal block 2, Pin 7
Wiper Input Impedance	10K Ohms
Wiper Input range	.6V - 4.4V
Resistance	10K Ohms
Minimum Power rating	1/8th Watt
Maximum Operating Input Voltage	7.2V +/- .5V (Higher voltages will lock out input)
Maximum Protected Input Voltage	30V
<b>0-10 Volt Input</b>	
Input Impedance	Terminal block 2, Pin 9 10K Ohms
Step response	Output current will equal: ((Input voltage x 0.1) (max current - min current)) + (min current) For every volt of input, output will change 1/10 its full range.
Maximum Operating Input Voltage	12.3V +/- .5V (Higher voltages will lock out input)
Maximum Protected Input Voltage	30V
<b>0-5 Volt Input</b>	
Input Impedance	Terminal block 2, Pin 10 10K Ohms
Step response	Output current will equal: ((Input voltage x 0.2) (max current - min current)) + (min current) For every volt of input, output will change 1/5 its full range.
Maximum Operating Input Voltage	7.8V +/- .5V (Higher voltages will lock out input)
Maximum Protected Input Voltage	30V
<b>4-20mA Input</b>	
Input Impedance	Terminal block 2, Pin 11 250 Ohms
Step response	Output current will equal: ((Input current - 4mA) (0.0625) (max current - min current)) + (min current) For every milliamp of input, output will change 1/16 its full range.
Maximum Operating Input Voltage	8.0V +/- .5V (Higher voltages will lock out input)
Maximum Protected Input Voltage	30V
<b>Enable Input</b>	
Impedance	When Enable is left open (high) the unit is operational. When the enable line is connected to ground (low) the board output immediately goes to 0 Amps. 560K Ohms
High state REN pin voltage	4.61V +/- 0.1V

# DEC005000

Digital Interface Card

Source current while pulled low	3.67mA
Ramping Enable Input	When Enable is left open (high) the unit is operational. When the enable line is connected to ground (low) the board output ramps down to the minimum output setting at the rate set by ramp adjustments.
Impedance	560K Ohms
High state REN pin voltage	4.61V +/- 0.1V
Source current while pulled low	3.67mA
<b>Auxiliary Output</b>	Terminal block 1, Pin 2
Maximum Current	2.5A

## ADJUSTMENTS:

Minimum output or zero setting	Clockwise rotation increases minimum output 0.1 - 3 Amps Maximum output will always be 50mA greater than the minimum output
Maximum output	Clockwise rotation increases maximum output 0.1 - 3 Amps Maximum output will always be 50mA greater than the minimum output
Ramping Down or Fall Time	Clockwise rotation increases ramp time 0.1 - 30 Seconds,
Ramping Up, or Rise Time	Clockwise rotation increases ramp time 0.1 - 30 Seconds

## ADJUSTMENT PROCEDURE:

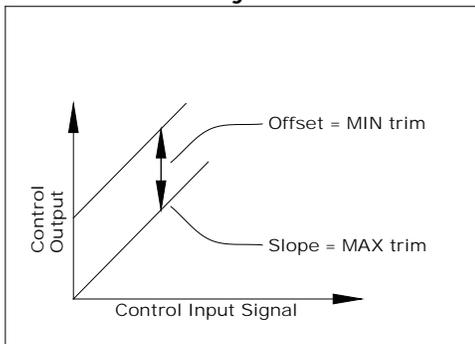
Adjustments are made by turning a trim pot screw. The trimmers are 25 turn, end to end devices. The trimmers have a built in slip clutches so over rotations do not damage them. It may be necessary to turn the adjustment screw several turns to observe a change in output. Start by adjusting the min output, and then adjust the max output to the desired level. The best way to fine tune adjustments is to observe the function response or speed. It is important to make adjustments in the following order.

1. Minimum output: Start by setting the master Potentiometer or input signal to zero. Turn the trimmer clockwise until the function begins to move. Now turn the trimmer back counter clockwise, one full rotation past the point of any visible movement.
2. Maximum output: Start by setting the master Potentiometer to the 100 position on the dial. Turn the trim pot counter clockwise to decrease function speed. Turn the trim pot clockwise to increase function speed. Function maximum speed will be limited to the max flow capabilities of your hydraulic system.  
Do not rotate the trim pot past the point of an observable increase in function speed.

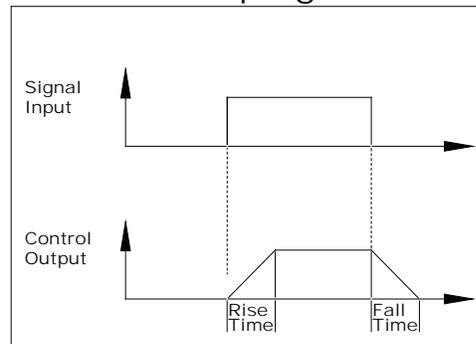
3. Ramp up: This feature changes how quickly the valve can open. Clockwise turns increase the amount of delay. Counterclockwise turns decrease the amount of delay.

4. Ramp down: This Feature changes how quickly the valve can close. Clockwise turns increase the amount of delay. Counterclockwise turns decrease the amount of delay. Use discretion when making this adjustment, this will affect how quickly your function stops.

### MIN/MAX Adjustments



### Ramping

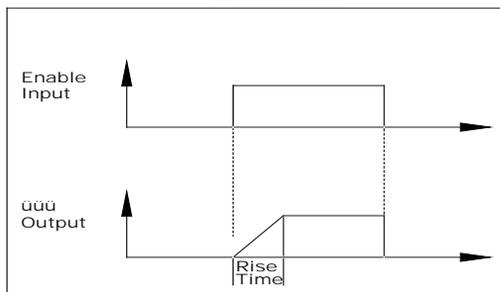


## ENABLE INPUTS:

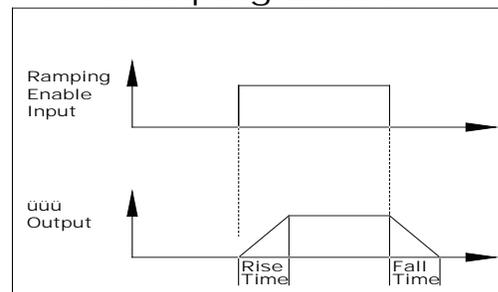
The Enable Inputs can be used to turn the controllers output on and off, without having to switch on/off the main power source. The DEC005000 cards are supplied with two unique types of Enable inputs, EN and REN. When the EN line is switched to ground the control will go into sleep mode. It will be as if the controls power source has been turned off. When the EN line is switched back to its normal state, open to ground, the control output will again respond to user input. A soft start can be achieved using the controllers Ramp Up adjustment.

The Ramping enable input, REN, allows for soft start and soft stop enabling. The REN input is also activated by being switched to ground. When the REN is activated the control will respond as if the user input signal has been turned off and the controls output will ramp down to the set minimum output value. When the REN input is returned to its normal state the control output will ramp up to the output level that corresponds with the user input signal. Soft start ramp and Soft stop ramp times are set using the onboard trim pots that are labeled UP and DOWN.

### Enable

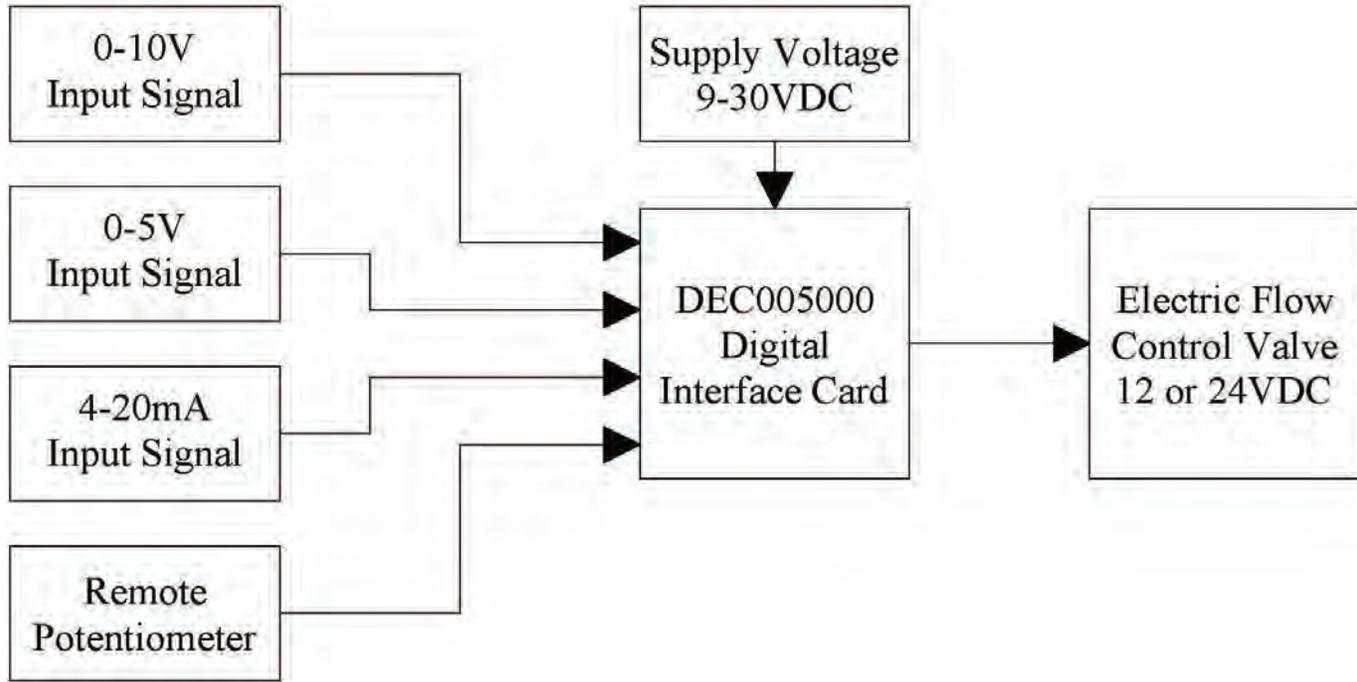


### Ramping Enable



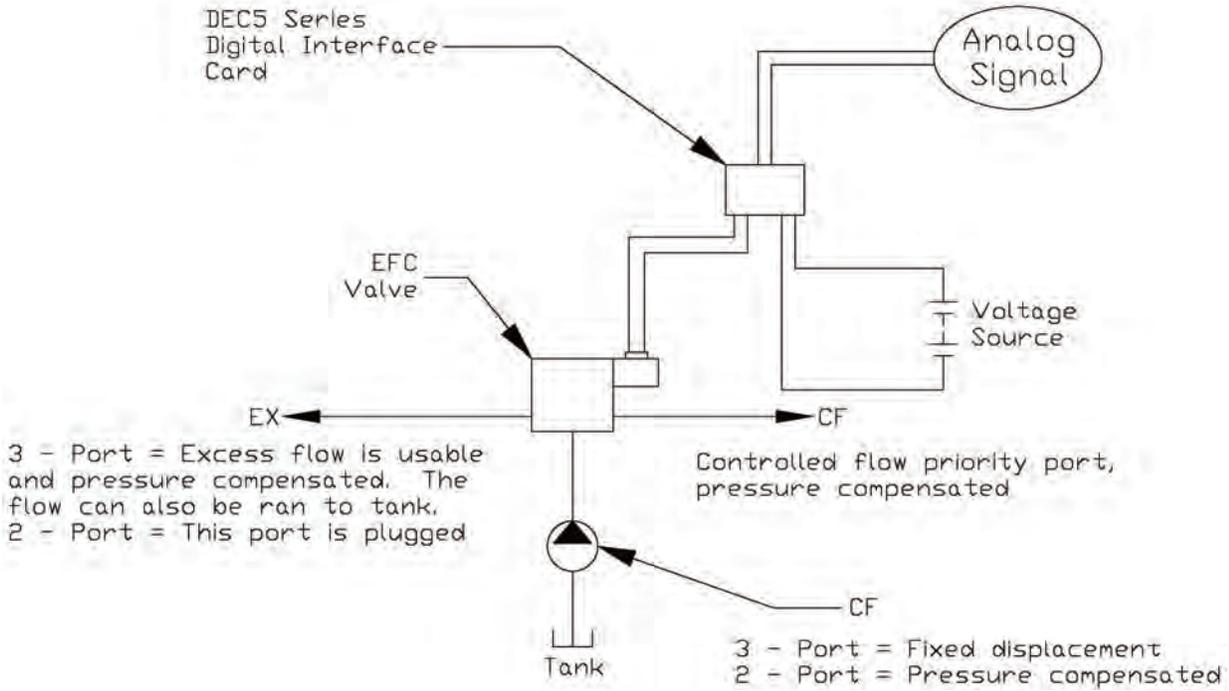
# DEC005000 Digital Interface Card

## TYPICAL SYSTEM CONFIGURATIONS:

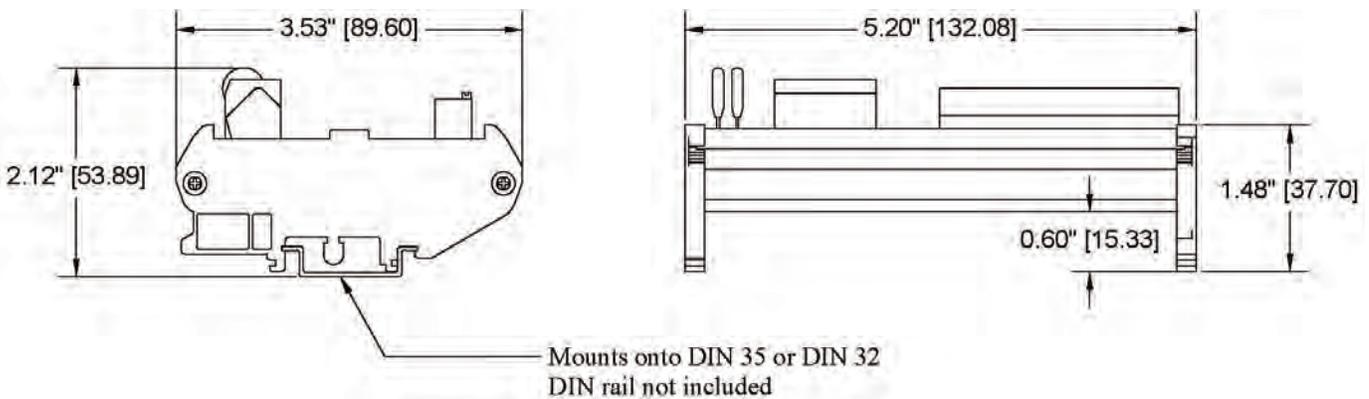


Note: Inputs are additive when two or more are used simultaneously. Other configurations are possible, contact factory for more information.

**DEC/EFC - SERIES SCHEMATIC DRAWING:**



**DIMENSIONAL DATA: inches & [millimeters]**



# DEC005000 Digital Interface Card

## INTERNAL LAYOUT:

### Diagnostic LED (D106)

LED will flash when an error mode has taken place. The following table lists the possible error modes and the corresponding LED flash sequence.

**OPEN LOAD:**  
ON - 0.25 seconds  
OFF - 0.25 seconds  
Blinks 10 times and pauses

**OVER CURRENT LOAD:**  
ON - 0.10 seconds  
OFF - 0.10 seconds  
Continuously blinks

**SHORT CIRCUIT LOAD:**  
ON - 0.10 seconds  
OFF - 0.10 seconds  
Continuously blinks

**OUTPUT DISABLED - ONLY FOR ENABLE:**  
ON - 0.25 seconds  
OFF - 2.00 seconds  
Continuously blinks

**POWER POLARITY REVERSED:**  
ON - Continuously, no blink

### Power LED (D100)

LED indicates when board has appropriate DC supply in the correct polarity

### Terminal Block Termination Details

#### T501

18-12 AWG wires go to circular holes.  
Strip wires 0.333". Screwdriver inserts into square holes. See Terminal Block callouts.

#### T502

28-12 AWG wires go to square holes.  
Strip wires 0.22". Screwdriver inserts into rectangular holes. See Terminal Block callouts.

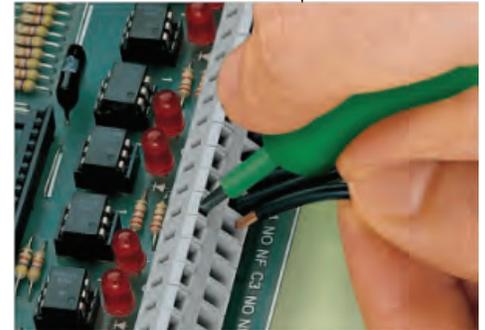
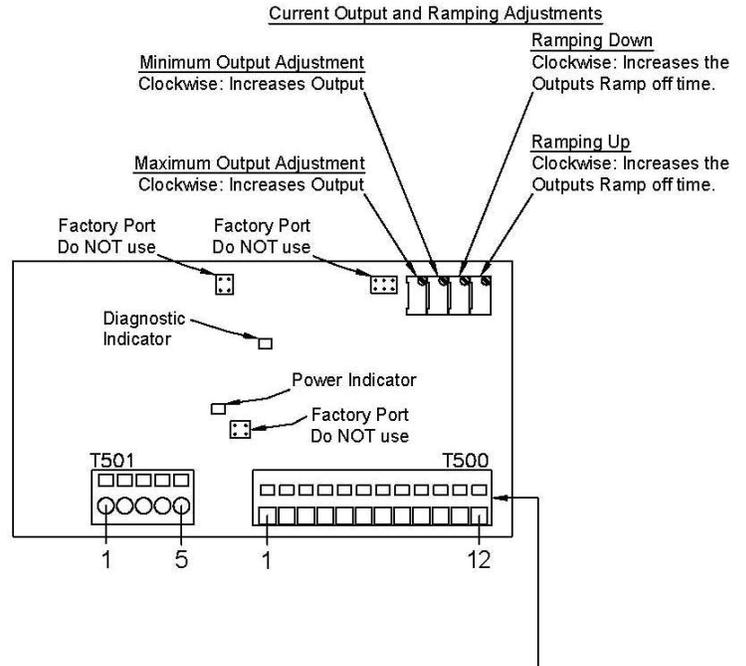
### Terminal Block Pin Outs

#### T501

1. Positive Supply Voltage, 9-30VDC
2. Auxillary Supply Voltage output, Not to Exceed 2.5A, unfused
3. Output to EFC Valve, 3A Maximum
4. Ground for EFC Valve
5. Negative Supply Voltage

#### T500

1. Enable input, Apply a ground to disable the board or leave Open for normal operation.
2. Ramping Enable input, Apply a ground to disable the board or leave Open for normal operation.
3. Ground
4. Ground
5. 5V Reference for potentiometer.
6. 5V Reference for potentiometer.
7. Potentiometer wiper Input
8. Ground for Potentiometer. (Note: Wiper input will not function without the potentiometer being grounded at this pin.)
9. Positive 0-10V signal input
10. Positive 0-5V signal input
11. Positive 4-20mA input
12. Signal Ground, Negative loop return



### FACTORY SETTINGS

Ramp up time 0 seconds

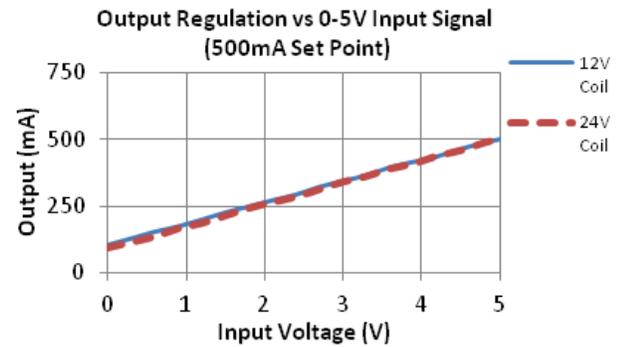
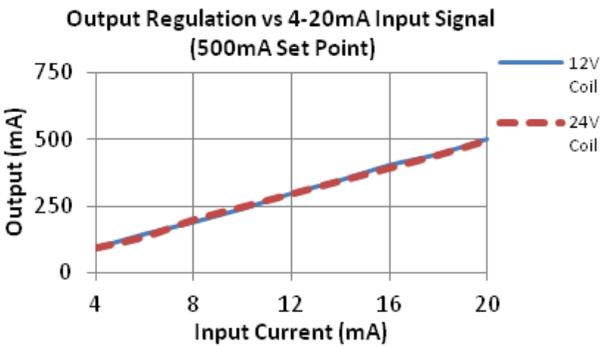
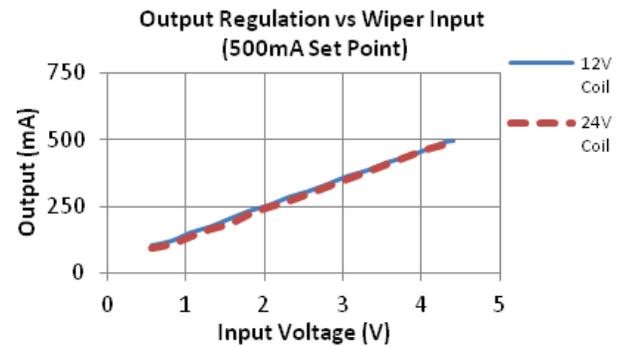
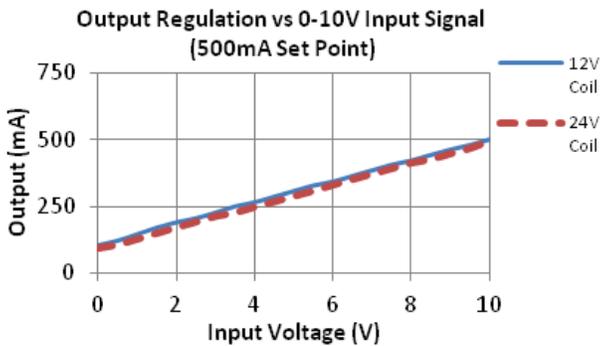
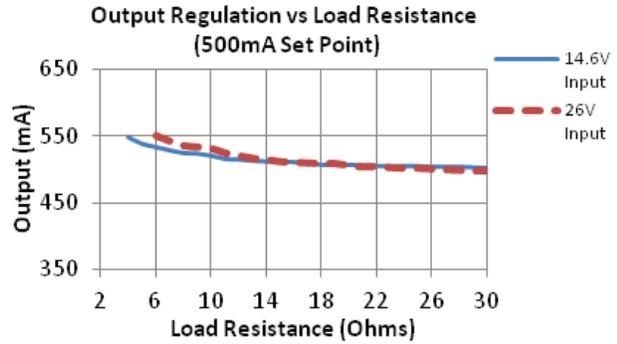
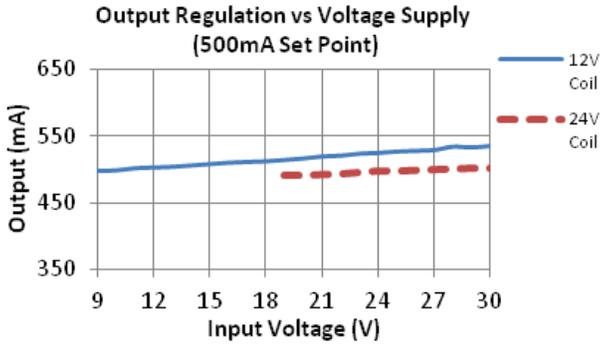
Ramp down time 0 seconds

Min. output set at 0.0 Amps

Max output adjusted for 1 Amp at full

Frequency set at 100 Hz

**OUTPUT:**



Note: All the above readings were taken with the DEC005000 adjusted for a .5 Amp maximum output at 100 Hz. A 14.6V supply was used for 12V coil tests and a 26V supply was used for 24V coil tests.

**EC - ACCESSORIES:**

- E1049.....Panel mount fuse holder
- E1050.....Knob, Black
- E1071.....Potentiometer shaft seal
- E1747.....Power switch, SPST, screw terminals
- E1758.....Switch boot seal
- E1803.....Long Life Potentiometer, 10K w/ 6" Leads

