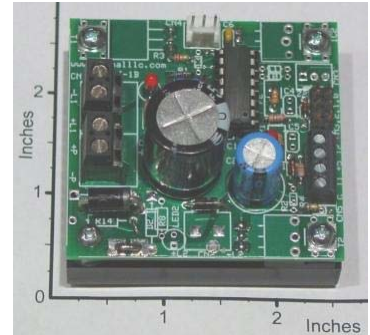


## Si14HyUdMC1-50V-20A Hybrid, Unidirectional, Motor Controller with RS232 LCD Port and 5kHz or 20kHz PWM, Y-Chip

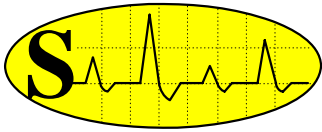
The **Si14HyUdMC1-50V-20A** is a 50V, 20A single, microprocessor based, Hybrid, Unidirectional, Motor Controller that uses pulse-width modulation (**PWM**) to efficiently control the power flow (or motor speed) to a brush type DC motor, from 0 to 1000W, in 8.33W steps. An onboard microprocessor generates a 5kHz or 20kHz **PWM** carrier signal, controls the load power (or motor speed), monitors the user inputs and selects the motor acceleration delay. An optional "Kill-Switch" can be connected to **J1** for Emergency Stop (**J1**=Open= Run; **J1**=Short=Stop). The **PWM** carrier frequency is user selectable by the jumper **J2**, 20kHz when **J2** is open and 5kHz when short. The high-frequency PWM rate provides a smooth motor-speed control, and insures a quiet motor environment.



Two user selectable acceleration/deceleration modes are provided by short-circuiting or open-circuiting the pins labeled **J3**. The slow mode, with rise-time/fall-time of 0.5s, is selected by short-circuit (**J3** jumper installed); while the fast buildup mode, with rise-time/fall-time of 0.05s, is selected by opening these pins. As the name hybrid (**Hy**) implies, the required motor speed (or PWM pulse-duration) is derived from a variable 0 to +5V analog-voltages ( $V_{1,G}$ ), while the control-signals are digital. All analog control inputs are Zener Diode protected. An onboard LED (red) is used to monitor the load voltage and an optional. Snubbing circuits and filter capacitors are included to suppress inductive switching transients. A small Finned Heat Sink (2.4"x2.3"x0.9") is required to operate at 20A current level (or at 1000W power levels). Higher current levels (30A) or 1500W power-levels can be achieved with more efficient heat-sinks. This can be accomplished by bolting the heat sink to a larger metal surface. Please click on this link and read the [Board Mounting Instructions and Heat Sink Selection Guide](#). An optional 2 lines by 16 characters LCD (with 5V, 9600bps RS232 Interface Standard) is used for Measured-%PWM and Set-%PWM data display. This board requires a single unregulated 9V to 50V DC power source at 0A to 20A to operate normally. Typical applications are: DC Motor-Speed Controller with variable acceleration/deceleration, Light-Dimmer with variable Ramp-Time, etc.

### Specification and Application for Si14HyUdMC1-50V-20A

- **Typical Operating Temperature at 20A:** 45<sup>0</sup>C with the Metal Heat-Ring Bolted to a small Finned Heat Sink (2.4"x2.3"x0.9"), while the Heat Sink is exposed to air at 25<sup>0</sup>C (as shown on photograph).
- **Source-Voltage Requirements for  $V_P$  (voltage from pin +P to pin -P):** 9V to 50V, unregulated DC voltage.
- **Two User Selectable Motor Acceleration/Deceleration Modes:** Using Jumpers **J3**.
- **Adjustable Load Voltage  $V_L$  (voltage from pin +L to pin -L):** The average Load-Voltage is adjustable from 0V to 50V (or to  $V_P$ ) in 0.833% steps, with the Pulse-Width Modulation (%PWM) control signal ( $V_{1,G} = 0$  to +5V) or with an internal/external potentiometer.
- **Average Load Current  $i_L$ :** 0A at 0% Duty-Cycle, 20A max. at 100% Duty-Cycle.
- **Load Isolation :** The load (**motor**) must be isolated from the source voltage ( $V_S$ )
- **PWM Switching Frequency:** User selectable; 20kHz when **J2 Open**, 5kHz when **J2 Short**.
- **PWM Duty-Cycle:** Varies linearly from 0% to 100% in 0.833% steps using  $V_{1,G}$  as the control voltage ( where  $V_{1,G} = 0V$  yield 0%, and  $V_{1,G} = +5V$  yield 100% Duty-Cycle).



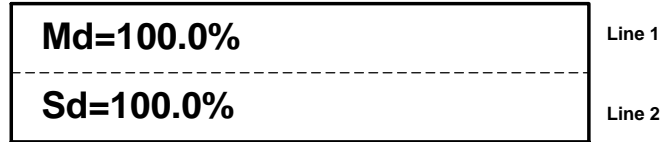
# Signal Consulting, LLC

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The motor speed varies linearly with the duty-cycle. Note that the Duty-Cycle is defined as the ratio of the load-voltage on-time ( $\tau$ ) to the switching period (T) times 100%, (i.e. Duty-Cycle =  $(\tau / T) \times 100\%$ ). These variables are defined and shown on the application drawing.

• LCD Data Format:



**Md:** Measured duty-cycle in %.

**Sd:** Set duty-cycle in %.

## A Typical Si14HyUdMC1-50V-20A Application

In this 50V open-loop speed-control application, the PWM pulse-duration (or motor-speed) is linearly adjusted by an external 1-turn 5k $\Omega$  pot **P1**; and efficiently controlling the motor (or load) power in the 0 to 1000W range in 8.33W steps. This potentiometer can be ordered from Signal with part number of [Si5Pot1-5k](#). A 2 line by 16 character LCD (with 5V, 9600bps RS232 Interface Standard) is used for Set-RPM and Measured-RPM data display. The LCD with back-light can be ordered from Signal with part number of [Si14LCD2L16CH](#). The DC Motor can be purchased from Bodine, [www.bodine-electric.com](http://www.bodine-electric.com).

Or from: [http://www.e-motorsonline.com/emotors/dcmproduct\\_list.php](http://www.e-motorsonline.com/emotors/dcmproduct_list.php).

