

MCDC506 All-Digital DC Servo Drive

Introduction

MCDC506 all-digital DC servo drive system adopts high-performance digital signal processor (DSP) and integrated circuit, and comes out to be a cost-effective product with simple circuit, high integration, easy operation, and strong practicability. MCDC506 provides three feedback loops: position loop, velocity loop and current loop. Three work control modes: position, velocity and torque. MCDC506 matches with DC servo motor under 50V and 200W.



Features

- * Position control: light isolates input PULSE/DIRECTION or CW/CCW signal;
- * Speed control: input simulates 0V~+3.3V voltage signal (speed input by Pos. ff);
- * Torque control: input simulates 0V~+3.3V voltage signal (torque input by Pos. ff);
- * Light isolation servo resets input interface ERC;
- * Light isolation failure alarm output interface ALM;
- * Width of current loop: (-3dB) 2KHz (typical value);
- * Width of velocity loop: 500 Hz (typical value);
- * Width of position loop: 200 Hz (typical value);
- * Quadrature encoder input interface at motor side: differential input (26LS32);
- * Allow parameters downloaded by pc or text displayed through interface RS232C;
- * Perfect protection against overload, I²T, over-voltage, under-voltage, over-heat, over speed, overproof protection;
- * Green light for on, red light for protected mode or off.

Specifications

- | | |
|---|--|
| * Input DC voltage range 20~50V(typical value); | * Maximum RS232C speed: 19.6Kbps (an extra transfer interface required); |
| * Continuous Output power: 200W; | * Working environment: |
| * Continuous output current: 6A 32KHz PWM; | No dust, no oil mist and no corrosive air; |
| * Overload output current: 18A(3S); | Working temperature: 0~+50°C; |
| * Protection: | Storage temperature: -20°C~+80°C; |
| Over current active value peak value: 30A±10%; | Humidity: 40~90%RH; |
| Over voltage active value: 65V; | Cooling method: natural air cooling and forced air cooling; |
| Under Voltage active value: 18V; | * Dimension: 118 x 76 x 35 mm |
| * Maximum pulse input frequency: 300K; | * Weight: about 250g |

Parameters Adjusting And Setting (potentiometer adjusting, CCW to minimize value, CW to maximize value)

Servo system includes three feedback loops position, velocity and torque(current). The inner loop responds to the fastest speed, and the middle loop must respond faster than the outer loop. A vibration or poor response will occur when the rule has not been followed. Customers only need to adjust the parameter of position loop and velocity loop only. Parameters of the system would restrict each other, the output of position feedback would be unstable when only the position feedback gains, which would lead to an unstable result of the whole servo system. Customers might take the following adjustment procedure as a reference:

- 1) set Pos. ff and Pos. D to 0 on the potentiometer, set the Pos. P and Vel. p to 1/3, and then increase the Vel. p slowly till a vibration happens, then return to the current value of 80%.
- 2) increase the Pos. P till a vibration happens, and then increase the Pos. D till the vibration disappears.
- 3) increase the Pos. ff to fulfill a minimum lag and overshoot.
- 4) decrease the Vel. p properly when a vibration happens while the motor is running.
- 5) decrease the Pos. P or increase the Pos. D properly if a vibration happens when the motor stops.
- 6) decrease the current properly when a magnet noise happens.

Maximize the Pos.P under the condition of no overshoot and no vibration. And then minimize the Vel.P, Pos.ff and Pos.D till a perfect setting.

Pos.ff: Position Feed-forward Control

Vel.P: Velocity Proportional Gain Control

Pos.D: Position Differential Control

Pos.P: Position Proportional Gain Control

Tor.P: Current Proportional Gain Control

Ports Details

Control signal I/O ports X1

Terminal block	Sign	Description	Note
1	PUL+	Pulse positive input	High effective
2	PUL-	Pulse negative input	Low effective
3	DIR+	Direction positive input	High effective
4	DIR-	Direction negative input	Low effective
5	ERC+	Servo reset positive input	High effective
6	ERC-	Servo reset negative input	Low effective
7	ALM	Alarm output signal	Collector output
8	EGND	Ground alarm output	Ground collector output

Encoder feedback signal input port X2

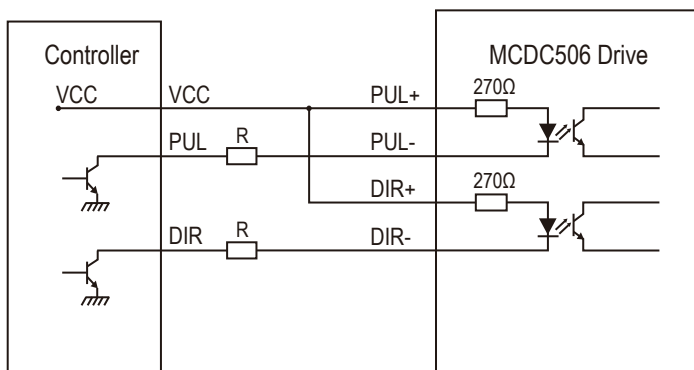
Terminal block	Sign	Description	Note
1	GND	Ground output power	
2	PB-	Encoder B-phase negative input	
3	PB+	Encoder B-phase positive input	Single-side connection
4	PA-	Encoder A-phase negative input	
5	PA+	Encoder A-phase positive input	Single-side connection
6	VCC	Output power	

Power Ports X3

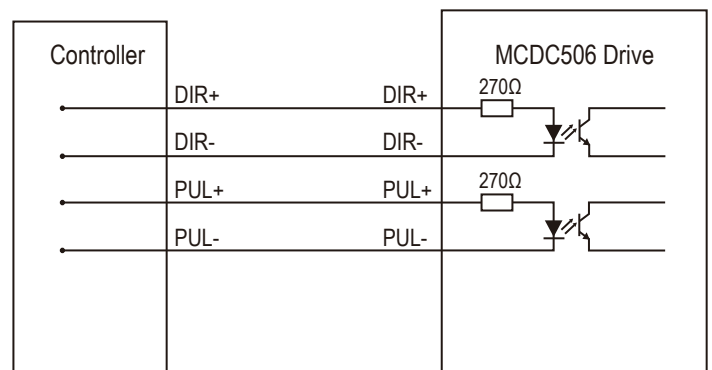
Terminal block	Sign	Description	Note
1	S+	Motor S+ side	Motor armature
2	S-	Motor S- side	Motor armature
3	VDC	DC input	
4	GND	Ground input power	

Control Signal Wiring

Control signal using single-ended wiring,
Wiring diagram is shown below:



Control signal using differential wiring,
Wiring diagram is shown below:



Attention: Vcc=5V, R Short-circuited

Vcc=12V, R=1K, >0.125W Resistor

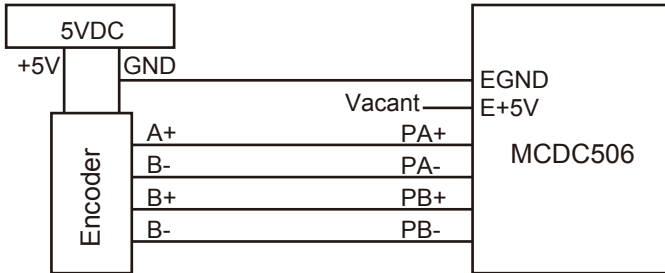
Vcc=24V, R=2K, >0.125W Resistor

Resistors must be connected to the control signal port.

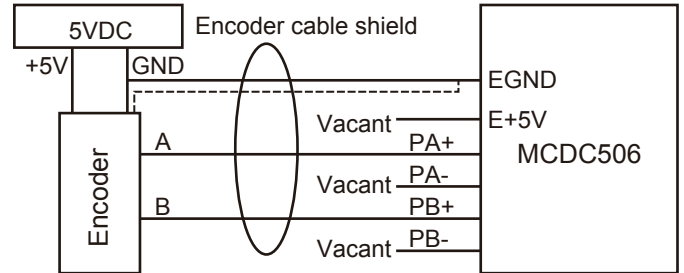
Encoder Wiring Diagram

When the encoder is less than 50mA, can be powered directly from the MCDC506, now the EGND should be received on the encoder ground, E+5V received the encoder +5V, encoder A-phase signal connected to the PA, encoder B-phase signal connected to the PB. When the encoder is more than 50mA, then need external 5V power supply.

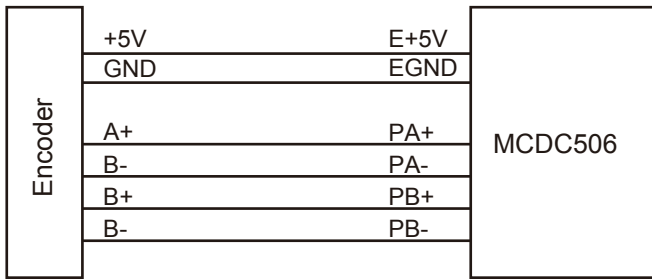
When the encoder uses an external power and signal wiring differential, wiring diagram is as follows:



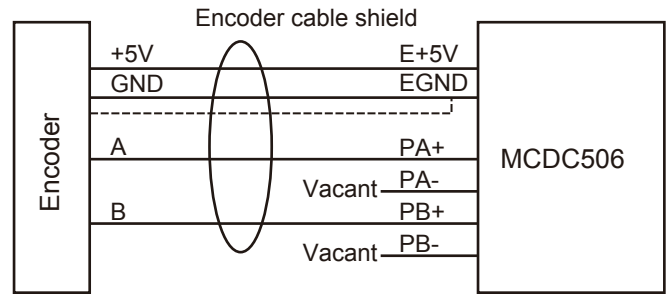
When the encoder uses an external power and signal single-ended wiring, wiring diagram is as follows:



When the encoder uses the drive internal power supply and signal wiring differential, wiring diagram is as follows:

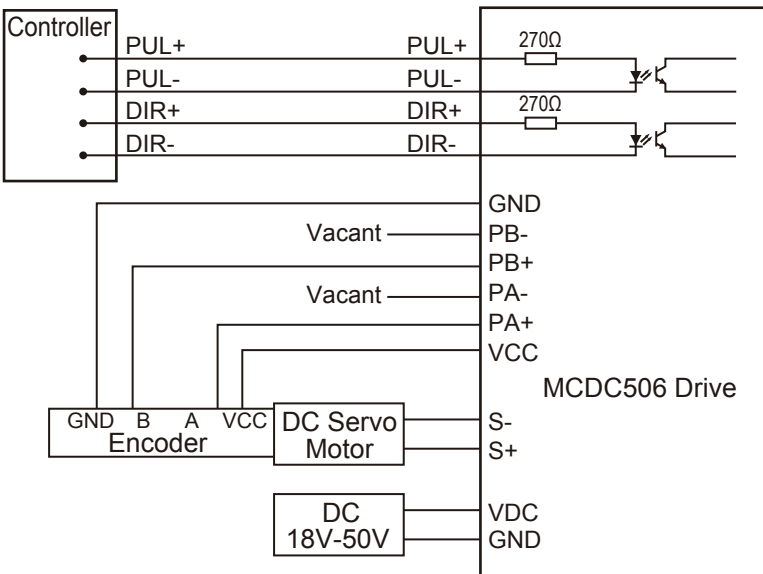


When the encoder uses the drive internal power supply and signal single-ended wiring, wiring diagram is as follows:



Note: In order to strengthen the drive immunity, when the servo motor encoder signals to single-ended output, do not bound encoder shielded twisted-pair cable, suspended by motor-side shield, depend on the drive end shield be connected to driver feedback signal input port GND of the X.

Wiring Diagram



Installation Dimension

