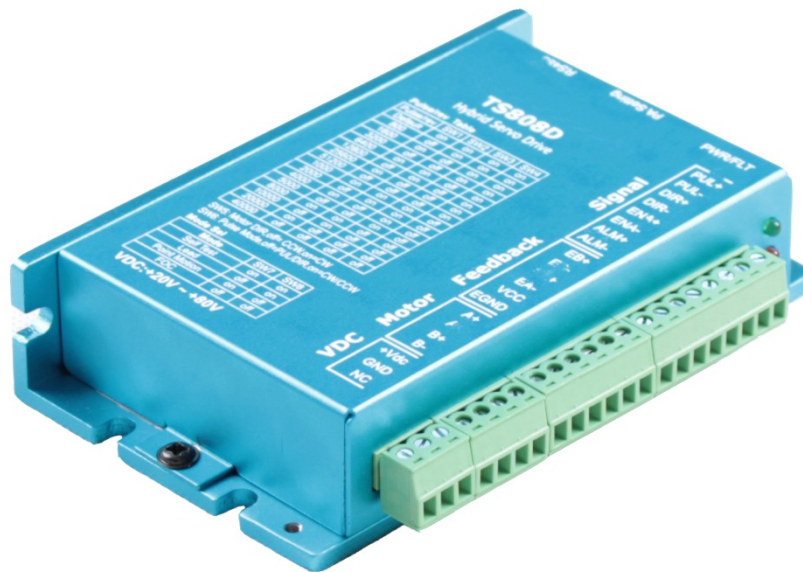




# *User Manual*

## *For TS808D*

### *Vector Hybrid Servo Drive*



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## ***1 Introduction***

TS808D is one of ECON technology's TS series hybrid servo drives, its power input is 24-80 VDC, and the output current is 0.5 -8A(peak). It can match Nema17,23,24 and 34 hybrid servo motors (stepper motor with encoder) with the position loop closed in real time.

Based on latest DSP technology and ECON technology's advanced control algorithm, TS808D hybrid servo drive applies servo vector control for hybrid servo motor. It combines features of both open loop steppers and brushless servo systems, and offers many unique advanced features for excellent motion control system performance.

When an TS808D hybrid servo drive is implemented with a ECON technology's TC series hybrid servo motor, there is No Configuration Needed for almost all applications. The default resolution is 2,000 pulses, and the user can also easily change the output resolution to resolutions 400 to 51,200 via DIP switches. With ECON technology's ProTuner, user can also set custom settings of resolution, current & position loop parameters, idle current percentage, etc.

## ***2 Features***

- ✧ Step and direction control
- ✧ Closed position loop for no loss of movement synchronization
- ✧ Input power range: 24-80 VDC
- ✧ Output current of 0.5 - 8 A(PEAK)
- ✧ High torque at starting and low speed
- ✧ No torque reservation
- ✧ High stiffness at standstill
- ✧ Significantly reduced motor heating
- ✧ Smooth movement and extra low noise
- ✧ Quick response, no delay and zero settling time
- ✧ No loss of steps; no hunting; no overshooting

## ***3 Applications***

With many unique advanced features, ECON technology's TS808D hybrid servo systems are ideal for many industries to upgrade stepper performance or replace AC/DC brushless servo systems in many applications

ECON technology's clients have successfully implemented TS808D hybrid servo systems in applications, such as small-to-large size CNC routers, CNC milling, plasmas, large-scale laser cutters/engravers, labeling equipment, robotics, gemstone processing machines, pick& place machines, X-Y tables

## ***4 Specifications***

### ***4.1 Electrical Specifications***

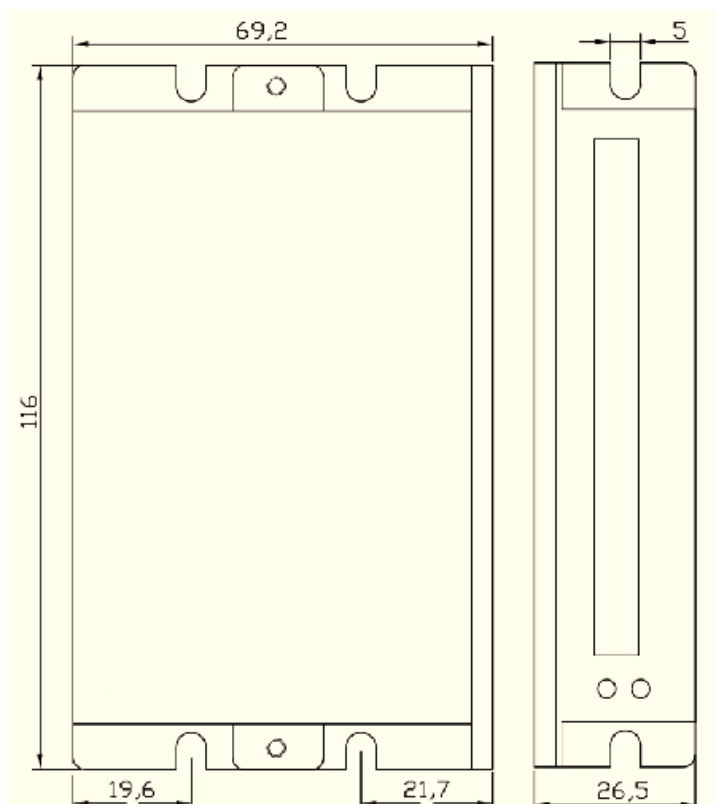


Parameter	Min	Typical	Max	Unit
Input Voltage (TS808D)	24	36/48/68	80	VDC
Output Current (Peak)	0.5	-	8	A
Pulse Input Frequency	0	-	150	kHz
Logic Signal Current	7	10	16	mA
Isolation Resistance	100	-	-	MΩ

### 4.2 Operating Environment

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Storage Temperature	-20°C — 65°C (-4°F — 149°F)
	Ambient Temperature	0°C — 50°C (32°F — 122°F)
	Humidity	40%RH — 90%RH
	Operating Temperature (Heat Sink)	70°C (158°F) Max
	Weight	0.5k g

### 5 Mechanical Specifications



## 6 Connectors and Pin Assignment

The TS808D has four connectors, connector for control signals connections, connector for status signal connections, connector for encoder feedback and connector for power and motor connections

### 6.1 Control signals connector

Pin	Definition	I/O	Description
1	PUL+	I	Pulse Signal: In PUL+DIR(pulse/direction) mode, this input represents pulse signal, each rising or falling edge active (software configurable, see hybrid servo drive software manual for more detail); In CW+CCW mode (software configurable), this input represents clockwise (CW) pulse, active both at high level and low level. 4.5-28V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 2.0μs.
2	PUL-	I	
3	DIR+	I	Direction Signal: In PUL+DIR mode, this signal has low/high voltage levels, representing two directions of motor rotation. In CW+CCW mode (software configurable), this signal is counter-clock (CCW) pulse, active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 2us at least. 4.5-28V when DIR-HIGH, 0-0.5V when DIR-LOW. Please note that rotation direction is also related to Motor driver encoder wiring match. Exchanging both the connection of two wires for a coil and an encoder channel to the driver he connection will reverse motion direction. Or you can toggle the SW5 to reverse the motion direction.
4	DIR-	I	
5	ENA+	I	Enable Signal: This signal is used for enabling/disabling the driver. In default, high level (NPN control signal) for enabling the driver and low level for disabling the driver. Usually left UNCONNECTED (ENABLED). Please note that PNP and Differential control signals are on the contrary, namely Low level for enabling. The active level of ENA signal is software configurable.
6	ENA-	I	
7	ALM+	O	ALM Signal: OC output signal, active when one of the following protection is activated:over-voltage, over current and position following error. This port can sink or source 70mA current at 24V. In default, the resistance between ALM+ and ALM- is low impedance in normal operation and become high when TS808D goes into error. The active level of alarm signal is software configurable.
8	ALM-	O	

## 6.2 Encoder Feedback Connector

Pin	Definition	I/O	Description
1	EB+	I	Encoder channel B+ input
2	EB-	I	Encoder channel B- input
3	EA+	I	Encoder channel A+ input
4	EA-	I	Encoder channel A- input
5	VCC	O	+5V @ 100 mA max.

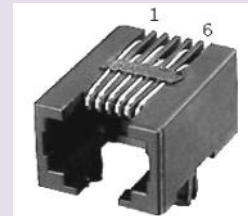
## 6.3 Power and Motor

Pin	Definition	I/O	Description
1	A+	O	Motor Phase A+
2	A-	O	Motor Phase A-
3	B+	O	Motor Phase B+
4	B-	O	Motor Phase B-
5	+Vdc	I	20-80VDC recommended, leaving rooms for voltage fluctuation and back-EMF.
6	GND	GND	

## 6.4 RS232/RS485 Communication Port

It is used to configure the close-loop current, open-loop current, position following error limit and etc. See hybrid servo drive software operational manual for more information.

Pin	Definition	I/O	Description
1	+5V	-	+5V power only for STU (Simple Tuning Unit).
2	NC		
3	TxD	O	RS232 transmit.
4	GND	GND	Ground.
5	RxD	I	RS232 receive.
6	NC	-	Not connected.



## 7 DIP Switch Settings

### 7.1 Microstep Revolution (SW1-SW4)

Steps/Revolution	SW1	SW2	SW3	SW4
Software Configured (Default 400)	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on



25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

### 7.2 Motor Direction (SW5) and Mode sel (SW6)

	Function	On	Off
SW5	Default <small>Note</small>	CW (clock-wise)	CCW (counter-clock-wise)
SW6	Mode Sel	PM	FOC

Note: You can toggle SW5 to change the motor direction.

SW6: it is function mode setting

ON is PM mode(position to position mode),this mode is good performance for start and stop

OFF is vector control mode

### 7.3 Motor Sel (SW7-SW8)

Motor Sel	SW7	SW8
SC42	on	on
SC57	off	on
SC60	on	off
SC86	off	off

### 7.4 Current Control

The motor current will be adjusted automatically regarding to the load or the stator-rotor relationship. However, the user can also configure the current in the tuning software. The configurable parameters include close-loop current, holding current, encoder resolution, micro step and etc. There are also PID parameters for the current loop, and they have been tuned for ECON technology’s matching motors so the user does not need to tune them.

## 8 Hybrid servo Motors

TS808D can work with the following ECON technology’s hybrid servo motors:





### 8.1 Nema17 hybrid servo motors

	TC42-03	TC42-04
Step Angle (Degree)	1.8	1.8
Holding Torque (N.m)	0.3	0.4
Phase Current (A)	2.3	2.3
Phase Resistance (Ohm)	0.9	1.1
Phase Inductance (mH)	1.66	1.7
Inertia (g.cm2)	57	62
Weight (Kg)	0.24	0.32
Encoder (lines / Rev.)	1000	1000

	TC42-06	TC42-08
Step Angle (Degree)	1.8	1.8
Holding Torque (N.m)	0.6	0.8
Phase Current (A)	2.3	2.3
Phase Resistance (Ohm)	1.3	1.74
Phase Inductance (mH)	2.3	4.2
Inertia (g.cm2)	86	1.2
Weight (Kg)	0.45	0.50
Encoder (lines / Rev.)	1000	1000

### 8.2 Nema23 hybrid servo motors

	TC57-10	TC57-22	TC57-28
Step Angle (Degree)	1.8	1.8	1.8
Holding Torque (N.m)	1.1	2.4	2.8
Phase Current (A)	6.0	6.0	13.0
Phase Resistance (Ohm)	0.2	0.4	0.2
Phase Inductance (mH)	0.52	1.5	0.36
Inertia (g.cm2)	0.30	0.48	0.58
Weight (Kg)	0.7	1.1	1.5
Encoder (lines / Rev.)	1000	1000	1000

### 8.3 Nema24 hybrid servo motors

	TC60-15	TC60-30
Step Angle (Degree)	1.8	1.8



<b>Holding Torque (N.m)</b>	1.5	3.6
<b>Phase Current (A)</b>	6.0	6.0
<b>Phase Resistance (Ohm)</b>	0.6	0.7
<b>Phase Inductance (mH)</b>	1.8	1.9
<b>Inertia (g.cm2)</b>	0.84	0.91
<b>Weight (Kg)</b>	1.1	1.4
<b>Encoder (lines / Rev.)</b>	1000	1000

### 8.4 Nema34 hybrid servo motors

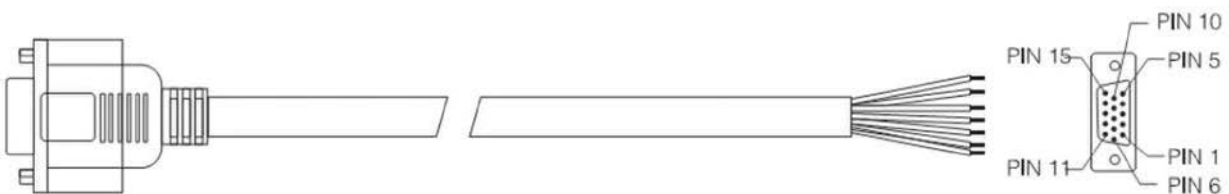
	TC86-45	TC86-85	TC86-120
<b>Step Angle (Degree)</b>	1.8	1.8	1.8
<b>Holding Torque (N.m)</b>	4.5	8.5	12
<b>Phase Current (A)</b>	6.0	6.0	6.0
<b>Phase Resistance (Ohm)</b>	0.325	0.5	0.73
<b>Phase Inductance (mH)</b>	3	6.0	8.68
<b>Inertia (g.cm2)</b>	1.4	2.7	4000
<b>Weight (Kg)</b>	2.3	3.8	5.3
<b>Encoder (lines / Rev.)</b>	1000	1000	1000

### 8.5 Motor Encoder Cable Connector

Pin	Name	I/O	Description
1	EA+	O	Phase A+
2	VCC	I	+5V power input
3	GND		Ground
11	EB+	O	Phase B+
12	EB-	O	Phase B-
13	EA-	O	Phase A-

HDD15 Male

### 8.6 Motor Encoder Extension Cable

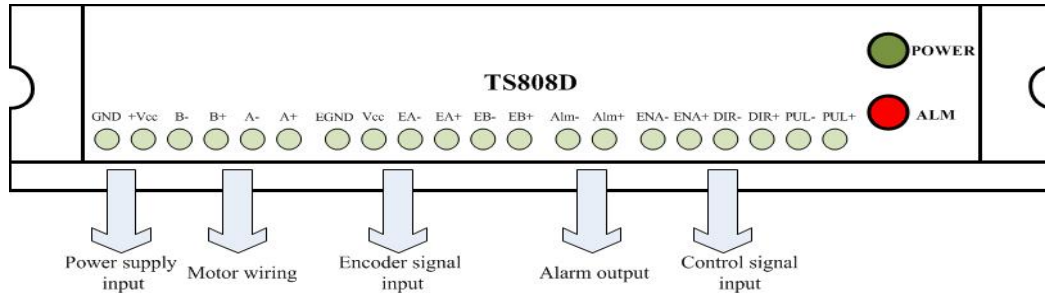


### Pin Assignments

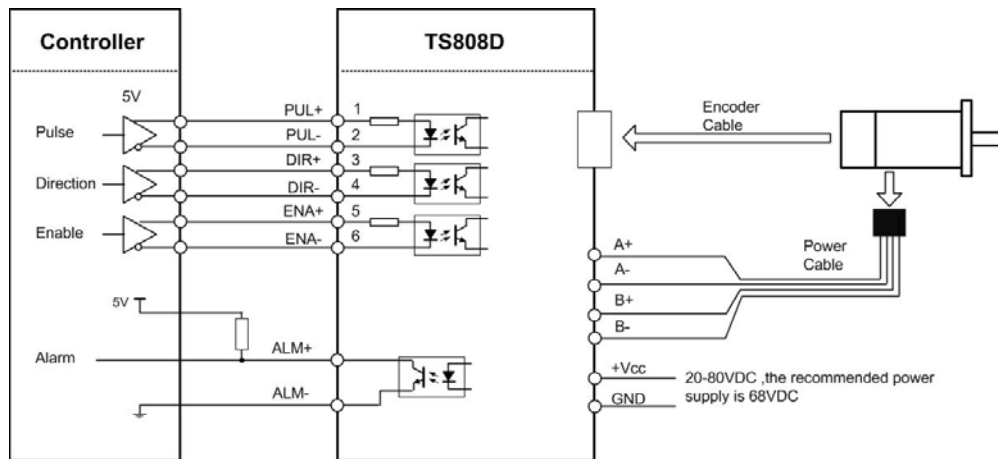
Pin	Wire Color	Definition	Description	Pin	Wire Color	Definition	Description
2	RED	VCC	+5V power input	12	BLK	EB-	phase B-
3	WHT	EGND	+5V GND	1	BLU/WHT	EA+	phase A+
11	BLK/WHT	EB+	Channel B+	13	BLU	EA-	phase A-

## 9 Wiring Diagrams

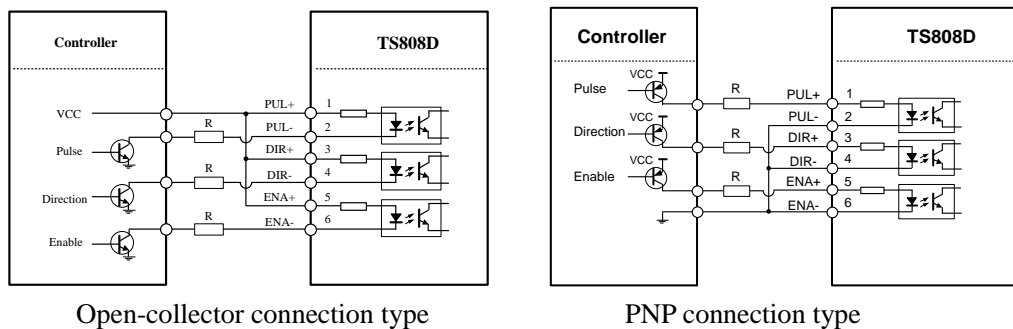
### 9.1 Interface



### 9.2 Diagram



### 9.3 Control Signal Wiring




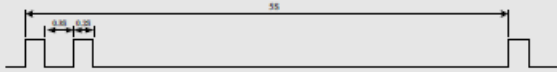

### Wiring Notes

- ✧ In order to improve anti-interference performance of the drive, it is recommended to use twisted pair shield cable.
- ✧ To prevent noise incurred in PUL/DIR signal, pulse/direction signal wires and motor wires should not be tied up together. It is better to separate them by at least 10 cm, otherwise the disturbing signals generated by motor will easily disturb pulse direction signals, causing motor position error, system instability and other failures.
- ✧ If a power supply serves several drives, separately connecting the drives is recommended instead of daisy-chaining.

- It is prohibited to pull and plug power connector while the drive is powered ON, because there is high current flowing through motor coils (even when motor is at standstill). Pulling or plugging power connector with power on will cause extremely high back-EMF voltage surge, which may damage the drive.

## 10 Protection Indications

The green indicator turns on when power-up. When drive protection is activated, the red LED blinks periodicity to indicate the error type.

Priority	Time(s) of Blink	Sequence wave of RED LED	Description
1st	1		Over-current protection
2nd	2		Over-voltage protection
3rd	7		Position Following Error

## 11 Frequently Asked Questions

In the event that your drive doesn't operate properly, the first step is to identify whether the problem is electrical or mechanical in nature. The next step is to isolate the system component that is causing the problem. As part of this process you may have to disconnect the individual components that make up your system and verify that they operate independently. It is important to document each step in the troubleshooting process. You may need this documentation to refer back to at a later date, and these details will greatly assist our Technical Support staff in determining the problem should you need assistance.

Many of the problems that affect motion control systems can be traced to electrical noise, controller software errors, or mistake in wiring.

### Problem Symptoms and Possible Causes

Symptoms	Possible Problems
Motor is not rotating	No power
	Microstep resolution setting is wrong
	Fault condition exists
	The drive is disabled
	The wiring is wrong
The drive In alarm	Power supply is over voltage
	Something wrong with motor coil
Wrong motor motion	Control signal is too weak
	Control signal is interfered
	Something wrong with motor coil
	Power supply voltage too low



Motor or drive is too heating	Inadequate heat sinking / cooling
	Load is too heavy

## **12 Warranty**

Shenzhen ECON Technology Co., Ltd. warrants its products against defects in materials and workmanship for a period of 12 months from shipment out of factory. During the warranty period, ECON technology will either, at its option, repair or replace products which proved to be defective.

### **Exclusions**

The above warranty does not extend to any product damaged by reasons of improper or inadequate handlings by customer, improper or inadequate customer wirings, unauthorized modification or misuse, or operation beyond the electrical specifications of the product and/or operation beyond environmental specifications for the product.

### **Obtaining Warranty Service**

To obtain warranty service, a returned material authorization number (RMA) must be obtained from customer service at e-mail: technical01@hybridservo.com before returning product for service. Customer shall prepay shipping charges for products returned to ECON technology for warranty service, and ECON technology shall pay for return of products to customer.

### **Warranty Limitations**

ECON technology makes no other warranty, either expressed or implied, with respect to the product. ECON technology specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. Some jurisdictions do not allow limitations on how long and implied warranty lasts, so the above limitation or exclusion may not apply to you. However, any implied warranty of merchantability or fitness is limited to the 12-month duration of this written warranty.

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