

# Assun Motor

## Product Manual



For 3 Amps Speed Driver of  
BLDC Motor with Hall Sensor

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# Contents

Assun Motor.....	1
Product Manual.....	1
1. About the Manual.....	3
1.1 Validity of This Document .....	3
1.2 Using This Document.....	3
1.3 Definition of Terms .....	4
1.4 Definition of Symbols.....	4
2. Product Safety.....	6
2.1 Intended Product Usage .....	6
2.2 Product Usage Safety .....	6
2.3 Product Disposal/Recycling .....	8
3. Product Series Information.....	9
3.1 Product Series Structure Introduction.....	9
3.2 Product Model Information .....	10
4. Product Function and Usage .....	11
4.1 Installation and Power Connection .....	11
4.2 Function Pin .....	12
5. Maintenance.....	14
Appendix .....	14
Appendix 1. Series Product Parameters .....	14
Appendix 2. Specified Product Drawing and Parameters .....	14
Contact.....	15

# 1. About the Manual

## 1.1 Validity of This Document

The product manual document here is used for AM-CDN-0305-LAAS series Speed Driver produced by Assun Motor. The manual has made detailed description to the safety and functional usage of the driver product. It helps the professional user to install and connect the driver, and also guide the user in relevant control function usage.

All data in this manual are based on the actual manufacturing and standard testing condition of AM-CDN-0305-LAAS product. Standard testing condition is when the motor installed horizontally and environment temperature is 25°C.

For relevant parameter summaries of the product series, please refer to Appendix 1 “Product Series Parameters”; For specified standard model or customized model, please refer to Appendix 2 “Detailed Product Drawing and Parameter”.

## 1.2 Using This Document

Please read this document carefully before install and set-up the product. Please pay extra attention to the second chapter “Product Safety”, and strictly follow the warnings and instructions.

Please retain this document throughout the entire working life of the product, and keep the document accessible to the operating and, if necessary, maintenance personnel at all times.

Pass a copy of this document on to any subsequent owner or user of the product.

## 1.3 Definition of Terms

Term	Meaning
PWM	Pulse Width Modulation
CW/CCW	Clockwise/Counter Clockwise
FG Pulse	Frequency Generator Pulse
F/R	Forward or Reverse turn, forward means CW, reverse means CCW
EN	Enable
BR	Brake
VIL/VIH	Voltage Input Low / Voltage Input High
Pin	Control Function Connect Pin
Cable	Power Connection Cable
GND	Ground / Negative Pole
Vcc	Direct Current Voltage
RPM	Revolution per Minute

## 1.4 Definition of Symbols



Caution! Hazard to persons. Disregard may lead to injury.



Warning! Improper operation will cause product damage.



Caution! Hazardous due to hot surface. Disregard may lead to burns.

## 2. Product Safety

### 2.1 Intended Product Usage

The Assun Motor AM-CDN-0305-LAAS series speed driver, which we are describing here in this manual, is used as electronic commutation for DC brushless motor with hall sensor, and can be used to achieve several control functions like PWM speed control, rotating direction change and braking when connected with analogue signal control.

The product must be properly installed when in use, and shall be operated in an environment with good heat dissipation conditions. In normal installation condition, when the operational parameters have not exceeded the maximum continuous values, driver board temperature must be maintained below 85°C.

The product is not suitable for operation in environments with high humid or excessive dust. During the operation, please follow the parameter limits in the appendices so as to achieve the optimum operational output and longest product lifetime.

For usage of product in special environment, please contact our local sales or service staff for consultancy and get the relevant advice or customized service.

This product is NOT SUITABLE for applications where the failure of the product could result in the death of an individual or group of individuals.

### 2.2 Product Usage Safety



The product is used to drive high-speed rotating device. Please make sure the product is properly mounted before commencement of operation to prevent potential hazards to people or equipment. Please refer to Chapter 4.1 of this manual for further installation guidance.



Motor surface temperature could be high after long term operation. Please exercise caution when touching or handling the product.



Power supply must be filtered DC. The input voltage shall be within the rated scope for normal operation. Current shall be controlled under the rated value, and short time current surge cannot exceed the max. current value.



**Power supply connection must be strictly according to the designated positive and negative polarity. If the power supply is reversed, the board will be protected and open circuit. For detailed power connection guidance, refer to Chapter 4.1.**



Please install the product in an environment with good heat sinking and/or ventilation. Inadequate heat dissipation will lead to the board temperature exceeding the limit of 85°C and will cause thermal damage to the internal electronic parts, resulting in malfunction and/or failure.



Please use the driver according to the parameter limits in the appendix, otherwise it may cause the driver to exceed current limits or overheat, which could lead to irreversible damage to the driver.



The driver is not suitable for operating in high humid and dusty environments. High humidity or excessive dust concentration may lead to malfunctions and shorter lifetime.



The product is a driver with internal electronic components. Please do not personally modify or disassemble the product.

## **2.3 Product Disposal/Recycling**

This series of driver products is manufactured with multiple types of metals, alloy materials, chemical adhesives and plastics. Please dispose it properly as recyclable material. For a detailed product material listing please refer to Chapter 3.1.



## 3. Product Series Information

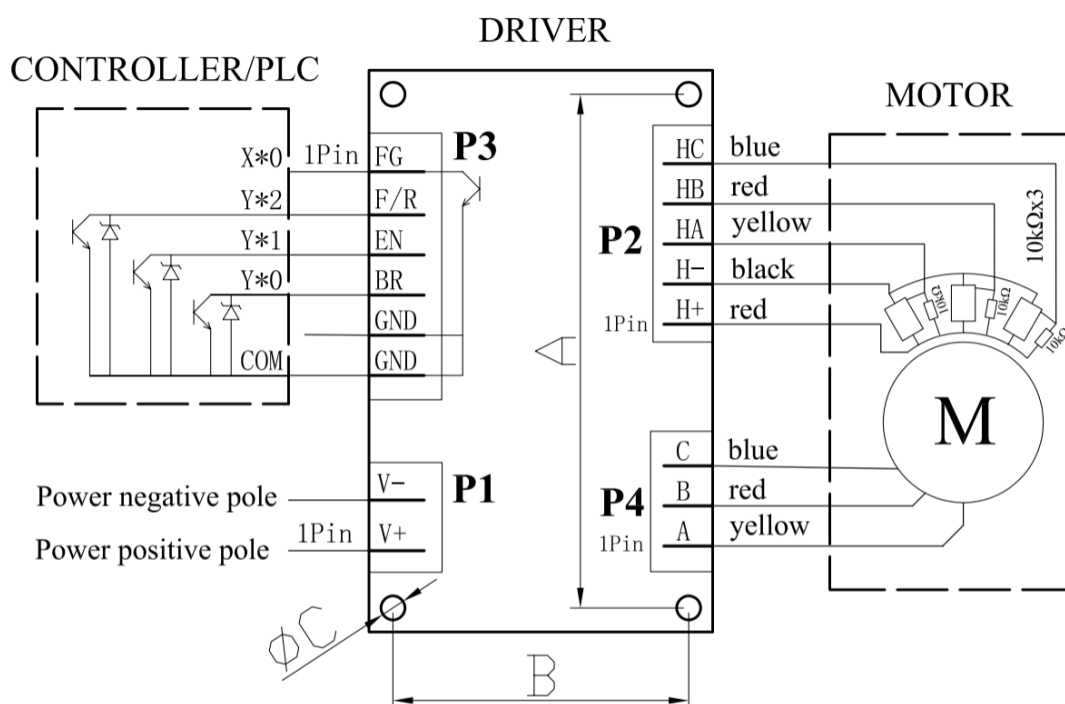
### 3.1 Product Series Structure Introduction

AM-CDN-0305-LAAS series products is a speed driver board used to drive precision DC brushless motors. Its' installation dimension is 34mm × 28mm, rated voltage 12-28V, continuous current at 3A, short term max current at 5A. For detailed series information and parameters please refer to Appendix 1.

There will be two DC power input connection pins and three output power pins, supplying DC power to the three winding phases of BLDC motor for electronic commutation.

The detailed circuit connection as following Illustration 1.

Illustration 1. Driver Circuit



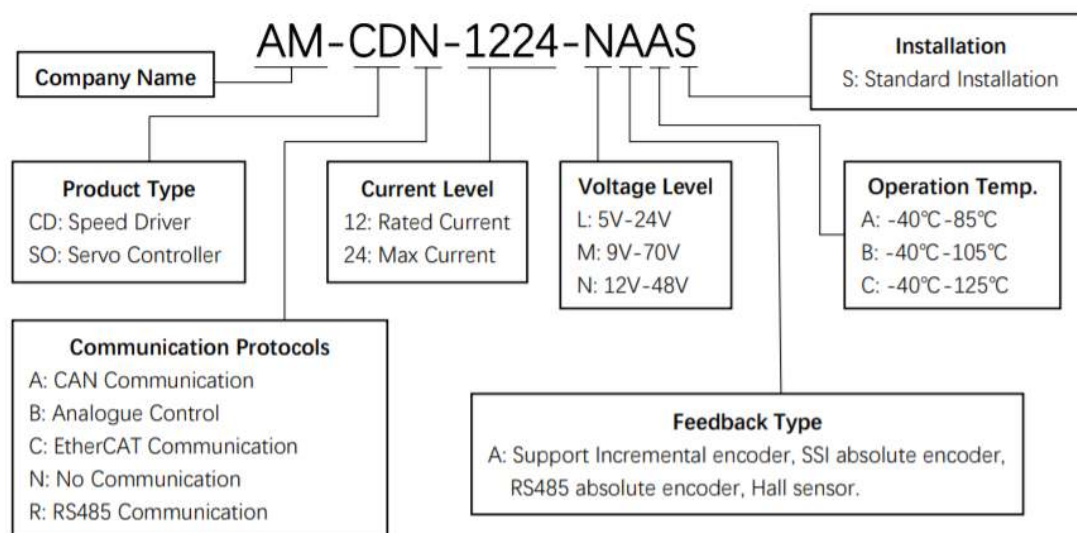
This series of product are manufactured using materials using multi-types of metal, alloy material and chemical products. Specific material usage as shown in Table 1.

**Table 1. Product Material Matrix**

<b>Components</b>	Pin Housing	PCB Board	PCB Circuit	Glue	Cable Core	Cable Insulation	Other Materials
<b>Material</b>	Plastic	Glass Fiber & Copper	Copper	Epoxy Resin	Copper	Plastic (Teflon)	Precious Metals; Silicon.

### 3.2 Product Model Information

To make it convenient for the customer to understand the part number methodology, please refer below in Illustration 2 the explanation for model number composition principle.



**Illustration 2. Part Number Nomenclature**

Customers can choose suitable products based on their types and characteristics shown in the part number methodology. If products with special characteristics are required, please contact our regional sales person for customized services.

## 4. Product Function and Usage

The driver has four connection ports. P1 is power connection port, used for connecting to DC power supply; P2 is motor sensor port, used for connecting to motor Hall sensors; P3 is control signal port, used for connecting to analogue control and achieve multiple control functions; P4 is electrical connection port, which is used to supply power to the motor three phase winding.

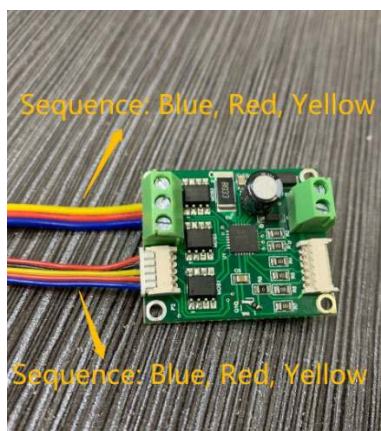
### 4.1 Installation and Power Connection

Driver must be properly and securely mounted., typically utilizing the installation holes on the PCB board to fix the motor. It will be proposed to install the driver to metal parts, or installed in well ventilated environments for better heat dissipation.

**!** For the power connection port P1, on the backside of board, there are marks showing which port is for positive or negative power supply. Please connect the DC power according to such guidance, otherwise the driver will be in open circuit condition and will not work.

For the power connection port P4, there are three pins, on the backside of board, there are also marks stating which pin is for winding phase A, B or C. Meanwhile for P2, which is for Hall Sensor, there are also such guidance for each pin function. Usually we could just use motor cable color for such guidance. The cable color order that connects o P4 must be the same with the color order that connects to P2.

See the following pic for reference.




*Note: The connection of Hall Sensor and Power share the same cable color sequence.*

## 4.2 Function Pin

Connection port P3 is function port that has 6 pins, among which 4 pins are function control pins and 2 pins are ground pins. The function control pins are controlled by analogue voltage signal. 0-0.8V DC is low signal, 2.2-5.0V is high signal, when pin not connected, it is empty, and when connected to ground pin, it is short circuit and is 0V which is low signal.


Pin 1 is speed signal output pin. It will give three pulses per revolution of motor. So, such pulses could be counted to calculate the motor speed, or to be used as a simple magneto encoder. The pulse is 5V, 50% duty ratio, and current is below 2mA.

Pin 2 is for motor rotating direction control. When this pin is given low voltage, motor will rotate in CW direction. When this pin is given high or empty voltage, motor will rotate in CCW direction. So if we connect the pin 2 cable to ground cable, motor will run in CW direction; if we don't connect pin 2 to anything, then motor will run in CCW direction.


 **Note:** When rotating speed over 100rpm,-CAUTION do not reverse the motor direction while the motor is rotating! It is highly recommended to stop the motor before reversing motor rotational direction.

Pin 3 is enabling pin. When in low voltage, motor will be able to run; but when in high or empty voltage, motor will not run. So if no speed control is needed, we could just connect the pin 3 cable with ground cable, then motor will run in it's max speed.

Meanwhile this pin can be used for PWM speed control. PWM frequency to be 20 KHz. Duty ratio is defined as the percentage that low-level voltage takes up. The higher the duty ration, the greater the speed.

 **Note:** Please avoid to set the duty ratio below 5%. When the duty cycle is needed to be lower than 5%, please set it directly to 0%.

Pin 4 is braking pin. When in low voltage, there will be electronic braking to motor, and when in high or empty, there will be no braking force.

 **Note:** When use the brake function, motor power supply voltage will rise due to the motor's back emf adding to the supply voltage. For this series of product, Voltage shall not exceed 28V. User shall test and adjust the speed for motor to start braking based on the specified load condition. If the voltage goes too high when braking, please set the motor to start braking in a lower speed to protect the motor and electronics.

When motor is not connected to the controller, pin 4 loses its function of speed control. When the pin is not connected, the motor will never run. If need the motor to run without controller, then we need to connect the PWM control (Pin 4) with the control ground (Pin 1). When pin 4 and pin 1 are connected, it is same as duty cycle command has reached 100%, the motor will run its maximum speed, and the speed will vary with the power supply voltage and the load on the motor.

## **5. Maintenance**

The product is maintenance free, please do not modify or disassemble in person. There are no repairable components inside the driver. Regarding any quality issue or maintenance needs, please contact our regional service person for relevant technical support.

Ignoring this warning will void the warranty.

## **Appendix**

### **Appendix 1. Series Product Parameters**

### **Appendix 2. Specified Product Drawing and Parameters**

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