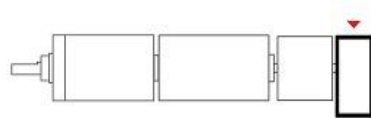


# Assun Motor

## Product Manual



For Absolute Encoder

of

AM-EN2211S113 Series

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# 1. About the Manual

## 1.1 Validity of This Document

The product manual document here is used for AM-EN2211S113 series absolute encoder, produced by Assun Motor. The manual has made detailed description to the safety and functional usage of this product series. It helps professional user to install and connect the encoder, and also guide the user in relevant function usage.

All data in this manual are based on the actual manufacturing and standard testing condition of AM-EN2211S113 series product. Standard testing condition is environment temperature at 25°C and relative humidity at 30%-60%.

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                                |
|---------|--|
| PRR     | Pulse Per Revolution                   |
| CW/CCW  | Clockwise/Counter Clockwise            |
| Channel | Signal Output Channels                 |
| 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                  |
| SSI     | SSI Protocol                           |
| NSL     | Enable Signal                          |
| SCL     | Clock Rate Signal                      |
| DO      | Data Output Signal                     |

### 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-EN2211S113 series three channel absolute encoder are suitable for position signal output under rated DC power supply, it suitable for various DC drive and precision motion control systems. Product has three channel digital signal output; output signals are differentiated.

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, encoders connect to the end of motor or brake to become the last part of drive system. When motor or brake that connects to the encoder are in normal temperature, the encoder could work properly.

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 to adjust the power supply and running state, so as to achieve the optimum signal 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 a content of high-speed rotating parts. 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.



Product surface could be hot after long term touch of operating motor or brake. Please exercise caution when touching or handling the product.



Power supply must be filtered DC and the input voltage must be at rated value for normal operation. Cable and pin connections must be strictly according to manufacturer's guidance for products' normal operation. Wrong connections could damage the product. For detailed connection guidance, please refer to chapter 4.1.



Please install the encoder in an environment with good heat sinking and/or ventilation. Inadequate heat dissipation will lead to the product overheat and will cause thermal damage to the internal electronic parts, resulting in malfunction and/or failure.



Please use the encoder according to the rated parameter in the appendix, otherwise it may cause the internal electronics damage, which could lead to irreversible damage to the motor.



The motor is not suitable for operating in high humid and dusty environments. High humidity or excessive dust concentration could lower the encoder accuracy and shorten the encoder lifetime.



The product is a high precision encoder with high accuracy assembly requirements. Please do not personally disassemble the product.

## **2.3 Product Disposal/Recycling**

This series of motor products is manufactured with multiple types of metals, alloy materials, chemical adhesives and lubricants. 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-EN2211S113 series products is a series of high-resolution electromagnetic encoder. Case diameter is  $\phi 22\text{mm}$ , case thickness is 10.7mm, rated voltage is 5V. For detailed series information and parameters please refer to Appendix 1.

The series product is single turn three channel absolute encoder, using electro-magneto principle, when the motor rotates, the magneto parts rotates together with the shaft, causing the magneto strength to change inside the encoder, and the magneto strength change will be transformed into the current signal change, then transformed into digital signal output. Due to the special arrangement of magneto field, every position output is unique and special, thus become absolute signal.

. The product's basic structure is depicted in illustration 1.

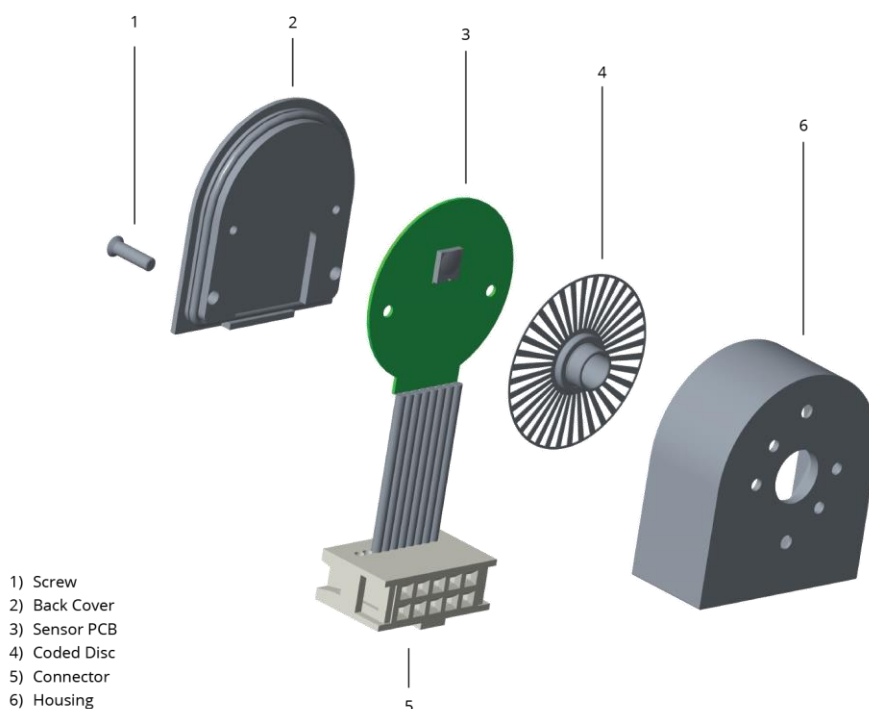


Illustration 1. Exploded Product View

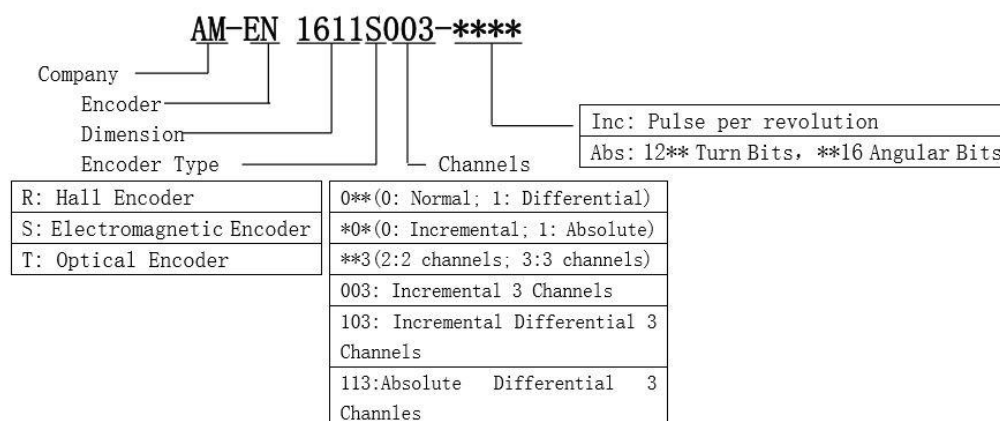
This series of product are manufactured using materials using multi-types of metal, alloy material and chemical products. Specific material usage as shown in Table 1.

**Table 1. Product Material Matrix**

|          |             |             |                            |                  |                  |                  |
|----------|-------------|-------------|----------------------------|------------------|------------------|------------------|
| Part     | Case        | Connector   | Magneto resistive sensor   | Disc             | Welding Material | Cable Core       |
| Material | Plastic     | Plastic     | Magneto resistive material | Magneto material | Tin              | Copper           |
| Part     | PCB Board   | PCB Circuit | Adhesive                   | Grease           | Screw            | Cable Insulation |
| Material | Glass Fiber | Copper      | Epoxy Resin                | Fluorine Grease  | Stainless Steel  | Teflon           |

### 3.2 Product Model Information

To make it convenient for the customer to choose a specific part number or model and 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 service.

### 3.3 General Technical Information

Table 2. Product Series General Technical Information


| Power | Signal Output                          | Ambient Temperature | Max. Inertia           | Max Clock Rate |
|-------|--|---------------------|------------------------|----------------|
| 5V±5% | V <sub>cc</sub> =5.0V,<br>SSI Protocol | -25°C~125°C         | 0.015g·cm <sup>2</sup> | 10 MHz         |

## 4. Product Function and Usage

The series of product has 10 output cables, in which 8 of them are effective, including the differential signals of enable, clock frequency and data output, and also the power supply positive and negative.

### 4.1 Installation and Power Connection

Encoder must be properly and securely mounted, typically utilizing the treaded holes in the motor end cover to connect with the motor, in special cases could also use adhesive for connection. It will be recommended that encoder installed by manufacturer. If customer need to install by themselves, then please be cautious and better contact manufacturer for guidance. Meanwhile the encoder shall be installed in the good ventilated environments for good thermal dissipation.

 **Connection of encoder to controller shall be strictly according to pin function arrangements. Wrong connection will lead to malfunction of encoder or even damage the encoder electronics. When fitting with Assun Motor controllers, the products will be well fitted before shipping. If customer wants to adopt other controller brands, then please contact Assun sales engineers for relevant guidance or customizations.**

## 4.2 Resolution Description

Resolution of the encoder series, also named as bits for absolute encoder, is 16 bits. The encoder are capable of giving  $2^{16}$  position signals, thus the precision gap level in the  $360^\circ$  rotation is  $0.0055^\circ$ .

The series of product is single-turn absolute encoder, un-capable of turn number recording. If the number of turns need to be recoded, the relevant functions shall be configured in the controller.

All output signals of this product are differentiated, and such differentiated signal could bring better stability to the system.

## 4.3 Three Phase Output Signal Description

The three channel output signals are SSI protocol signals.

In the output signals, the NSL is enable signal, and only when the NSL signal is in low voltage level, then the absolute encoder can output position data. The other two channels are clock frequency signal and relevant data output signal. There are 20 bits in data signal, among which 16 of them are position data, 3 of them are status data, while the other 1 is parity data.

## **5. Maintenance**

The product series is maintenance free, please do not disassemble in person. There are no repairable components inside the motor. 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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