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# Preface

## ■ Introduction

- The ES510-PG-CT1 card is an absolute encoder signal acquisition card based on RS485 bus communication. It is applicable to Inovance A3 series motors with 23-bit encoders.
- The ES510-PG-CT1 card is designed to work with Weton 23-bit encoders using a fixed protocol. It features a universal D-type (9-pin) female connector for external connection and interacts with the main control board through an 18-pin flexible printed circuit (FPC) flat cable.
- The ES510-PG-CT1 card is compatible with multiple AC drive series, including MD480-PLUS, MD500-PLUS, MD510, and MD520.

This user guide describes the applicable AC drives, technical specifications, dimensions, interfaces, installation, and wiring of this product.

## ■ Revision History

| Date          | Version | Description   |
|---------------|---------|---------------|
| December 2023 | A00     | First release |

## ■ Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following ways:

- Visit [www.inovance.com](http://www.inovance.com), go to "Support" > "Download", search by keyword, and then download the PDF file.
- Scan the QR code below to install the Inovance app, and search for the following AC drives in the app to obtain this guide.
  - MD480-PLUS
  - MD500-PLUS
  - MD510
  - MD520
  - IS580
  - ES590



## ■ **Warranty**

For faults and damage incurred during normal use in the warranty period, Inovance provides free repair service. (For details of the warranty period, see the purchase order.) A maintenance fee will be charged out of the warranty period.

Even in the warranty period, a maintenance fee will be charged for repair of the following damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance fee will be charged according to our latest Price List if not otherwise agreed upon.

For details, see the Product Warranty Card.

# 1 Product Information

## 1.1 Introduction

- The ES510-PG-CT1 card is an absolute encoder signal acquisition card based on RS485 bus communication. It is applicable to Inovance A3 series motors with 23-bit encoders.
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- The ES510-PG-CT1 card is compatible with multiple AC drive series, including MD480-PLUS, MD500-PLUS, MD510, and MD520.

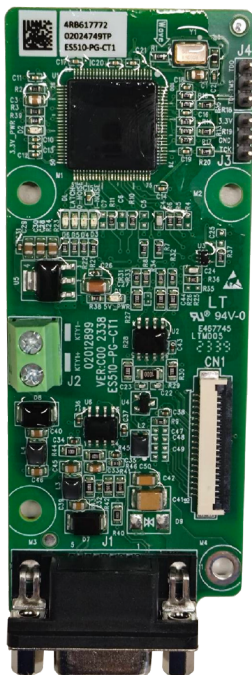


Figure 1-1 ES510-PG-CT1 card appearance

## 1.2 Applicable AC Drives

| Card Model   | Order No. | Applicable AC Drive |
|--------------|-----------|---------------------|
| ES510-PG-CT1 | 01320007  | MD480-PLUS          |
|              |           | MD500-PLUS          |
|              |           | MD510               |
|              |           | MD520               |
|              |           | IS580               |
|              |           | ES510               |
|              |           | ES590               |

### 1.3 Technical Specifications

| Item                      | Technical Specifications |
|---------------------------|--------------------------|
| 5 V encoder power supply  | 5 V/300 mA               |
| Encoder resolution        | 23-bit                   |
| Encoder data refresh rate | 16 kHz                   |
| RS485 communication speed | Max. 4 Mbps              |

Use a shielded twisted pair (STP) cable as the encoder cable. Determine the wire gauge based on the distance between the encoder and the AC drive. The wire gauge requirements are summarized in the following table.

| Cable Length (m) | Wire Gauge (AWG) |
|------------------|------------------|
| 10               | $\leq 20$        |
| 20               |                  |
| 30               |                  |
| 40               |                  |
| 50               | $\leq 18$        |
| 60               |                  |

The encoder cable specifications for different motors are summarized in the following table.

| Cable Code | Model        | Aviation Plug Type | Applicable Motor Series |
|------------|--------------|--------------------|-------------------------|
| 1504A289   | S58-P10-3.0  | Straight           | ESMG1/2 and MEG26/36    |
| 1504A290   | S58-P10-6.0  | Straight           | ESMG1/2 and MEG26/36    |
| 1504A540   | S58-P10-7.0  | Straight           | ESMG1/2 and MEG26/36    |
| 1504A291   | S58-P10-8.0  | Straight           | ESMG1/2 and MEG26/36    |
| 1504A292   | S58-P10-12.0 | Straight           | ESMG1/2 and MEG26/36    |
| 1504A293   | S58-P10-15.0 | Straight           | ESMG1/2 and MEG26/36    |

| Cable Code | Model          | Aviation Plug Type | Applicable Motor Series |
|------------|----------------|--------------------|-------------------------|
| 1504A294   | S58-P10-25.0   | Straight           | ESMG1/2 and MEG26/36    |
| 1504AW65   | S65-P10-5.0    | Straight           | ESMG1/2 and MEG26/36    |
| 1504AW66   | S65-P10-10.0   | Straight           | ESMG1/2 and MEG26/36    |
| 1504AZ44   | ES510-P10-6.0  | Bent               | ESMG1/2 and MEG26/36    |
| 1504BB72   | ES510-P10-8.0  | Bent               | ESMG1/2 and MEG26/36    |
| 1504B711   | ES680-P10-3.0  | Straight           | MEG20/23                |
| 1504B712   | ES680-P10-6.0  | Straight           | MEG20/23                |
| 1504B713   | ES680-P10-8.0  | Straight           | MEG20/23                |
| 1504B714   | ES680-P10-12.0 | Straight           | MEG20/23                |
| 1504B715   | ES680-P10-15.0 | Straight           | MEG20/23                |

## 1.4 Outline Dimensions

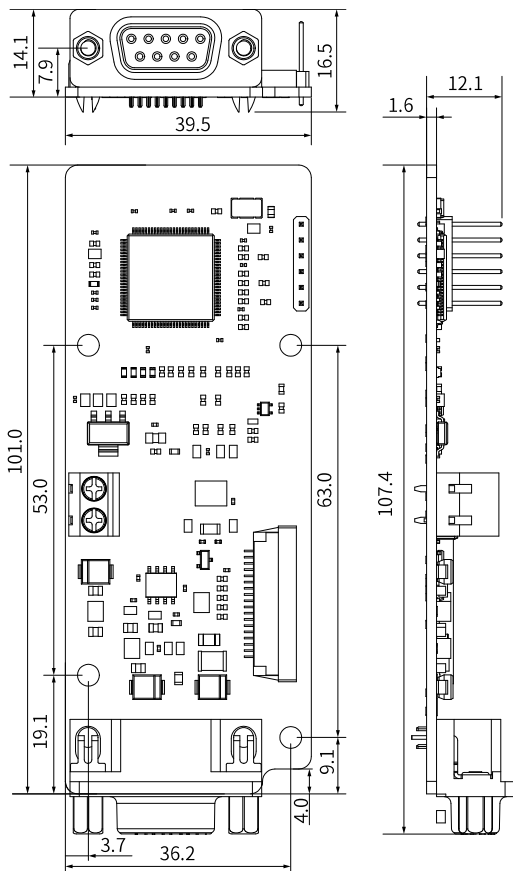


Figure 1-2 ES510-PG-CT1 card dimensions (unit: mm)

## 1.5 Interface Description

### ■ Interface layout

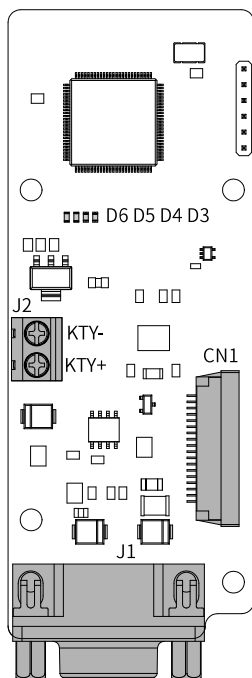
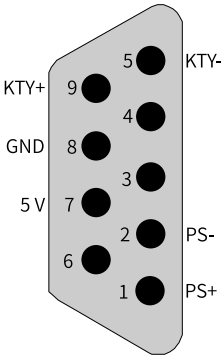


Figure 1-3 ES510-PG-CT1 card interface layout

## ■ Interface details

Table 1–1 ES510-PG-CT1 card interface function description

| Mark | Pin No.                                                                                                                                                                                                      | Terminal Name | Function Description              | Terminal Arrangement                                                              |                                      |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------------------|-----------------------------------------------------------------------------------|--------------------------------------|
| J1   | 1                                                                                                                                                                                                            | PS+           | Serial positive                   |  |                                      |
|      | 2                                                                                                                                                                                                            | PS–           | Serial negative                   |                                                                                   |                                      |
|      | 3                                                                                                                                                                                                            | NC            | Not connected                     |                                                                                   |                                      |
|      | 4                                                                                                                                                                                                            | NC            | Not connected                     |                                                                                   |                                      |
|      | 5                                                                                                                                                                                                            | KTY–          | KTY thermistor negative           |                                                                                   |                                      |
|      | 6                                                                                                                                                                                                            | NC            | Not connected                     |                                                                                   |                                      |
|      | 7                                                                                                                                                                                                            | 5V            | 5 V power supply for the encoder  |                                                                                   |                                      |
|      | 8                                                                                                                                                                                                            | GND           | 5 V power supply reference ground |                                                                                   |                                      |
|      | 9                                                                                                                                                                                                            | KTY+          | KTY thermistor positive           |                                                                                   |                                      |
| J2   | 1                                                                                                                                                                                                            | KTY+          | KTY thermistor positive           |  | Reserved for a 5.5 kW vertical motor |
|      | 2                                                                                                                                                                                                            | KTY–          | KTY thermistor negative           |                                                                                   |                                      |
| CN1  | Connects to terminal J4 on the drive control board through an 18-pin FPC flat cable (J4 is a terminal on the MD520 control board. For terminal naming of other AC drives, see the relevant hardware guides). |               |                                   |                                                                                   |                                      |

## Note

- The IS580 series AC drive supports the KTY terminals, while other series of AC drives do not.
- The KTY terminals in J1 and J2 share the same signal source and only one of them can be connected.

## ■ Status indicators

Table 1–2 ES510-PG-CT1 card indicators

| Indicator   | Mark    | Normal     | Fault                 | Cause                                                                                 | Action                                                                                                 |
|-------------|---------|------------|-----------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| D3<br>(Red) | I-NOISE | Steady OFF | Blinking or steady ON | Communication interference or disconnection between the PG card and the encoder       | Ground the motor properly and connect the ground point on the PG card to the PE terminal of the drive. |
| D4<br>(Red) | O-NOISE | Steady OFF | Blinking or steady ON | Communication interference or disconnection between the PG card and the control board | Ground the motor properly and connect the ground point on the PG card to the PE terminal of the drive. |

| Indicator     | Mark  | Normal                                                                                                  | Fault      | Cause                                                                                                                 | Action                                                                                                   |
|---------------|-------|---------------------------------------------------------------------------------------------------------|------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| D5<br>(Green) | LATCH | Slow<br>blinking -<br>Reading<br>motor<br>angle<br>Fast<br>blinking -<br>Reading<br>motor<br>parameters | Steady OFF | Communi-<br>cation<br>abnormali-<br>ty or disconnec-<br>tion<br>between<br>the PG card<br>and the<br>control<br>board | Check if the FPC flat<br>cable between the<br>PG card and the<br>control board is<br>properly connected. |
| D6<br>(Green) | DL    | Steady OFF                                                                                              | Steady ON  | The DB9<br>connector<br>is not<br>connected,<br>incorrectly<br>connected,<br>or<br>disconnect-<br>ed.                 | Check if the DB9<br>connector of the<br>encoder cable is<br>properly connected.                          |

## 2 Installation Guide

Install the ES510-PG-CT1 PG card in the reserved expansion card position on the AC drive with M3x8 screws. The following figure illustrates the installation of the ES510-PG-CT1 PG card on the MD520-T8 AC drive as an example.

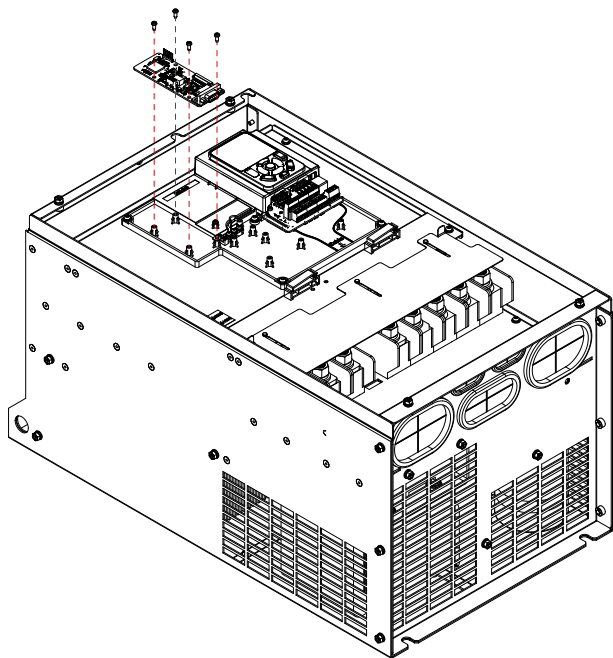


Figure 2-1 ES510-PG-CT1 PG card installation

### 3 Electrical Connection

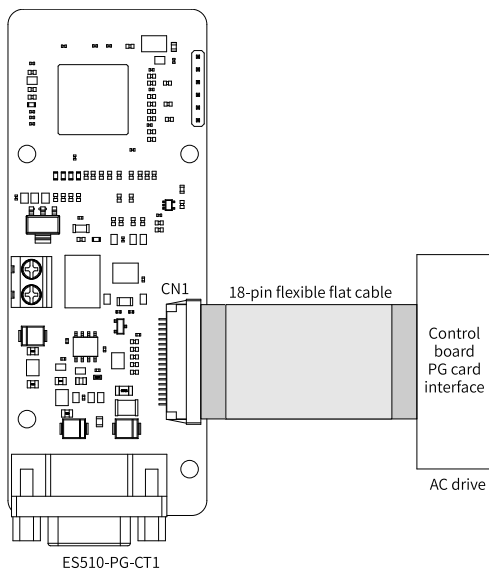


Figure 3-1 Electrical connection between the AC drive and the PG card