

EC-PG 系列 PG 扩展模块说明书

前言

感谢您使用英威腾 EC-PG 系列 PG 扩展模块！

EC-PG 系列 PG 扩展模块用于检测不同类型的编码器传输的信息，可以适配电梯产品 EC160 系列一体机以及 GD300L、GD390L 变频器整机等。扩展模块通过检测编码器的输出信号来监测电机的旋转速度，为精确速度控制提供实时速度反馈。

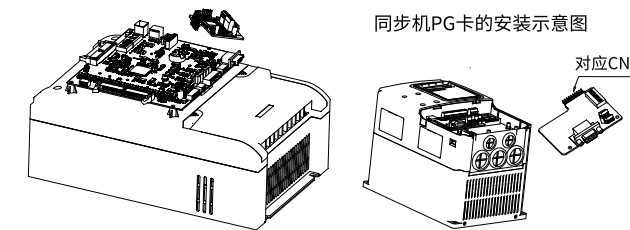
本说明书提供了产品信息、安装、接线与调试说明。为确保能正确地安装及操作本产品，发挥其优越性能，请在装机之前，详细阅读本说明书。

产品特点

- 针对不同类型编码器进行多路信号检测
- 为编码器提供电源：5V±5%或 12V±5%或 24V±5%/300mA（具体见各 PG 卡详细说明）
- 支持多种信号类型输入（具体见各 PG 卡详细说明）
- 支持脉冲给定与变频输出
- 具有编码器断线检测功能，避免系统故障影响扩大
- 采用数字滤波技术，提高电磁兼容性，实现编码器信号长距离稳定接收

1 产品信息

1.1 产品型号定义



EC - PG 1 01- 05 B
① ② ③ ④ ⑤ ⑥

表 1-1 型号说明

标识	标识说明	命名范例
①	产品类别	EC: 扩展卡
②	板卡类别	PG: PG 卡
③	技术版本	用 1、3、5 奇数来表示技术版本的第一、第二、第三代
④	区分代码	01: 增量式编码器 PG 卡 02: 正弦弦编码器 PG 卡 03: UVW 编码器 PG 卡 04: 旋转变压器 PG 卡 05: 增量型编码器 PG 接口+脉冲方向给定 06: 绝对值编码器 PG 卡接口
⑤	工作电源	00: 无源 05: 5V 12: 12~15V 24: 24V
⑥	版本号	板面接口形式差异由版本体现，默认 A 不体现，后续 B、C、D...

1.2 产品规格

表 1-2 规格说明

PG 卡类型	型号	功能规格
增量 PG 卡	EC-PG301-05B	5V 增量 PG 卡 180°插针 5V 推挽、开路集电极、差分输出增量型编码器
	EC-PG301-12B	12V 增量 PG 卡 180°插针 12V 推挽、开路集电极、差分输出增量型编码器
	EC-PG301-12D	12V 增量 PG 卡 90°插针 12V 推挽、开路集电极、差分输出增量型编码器
	EC-PG301-24B	24V 增量 PG 卡 180°插针 24V 推挽、开路集电极、差分输出增量型编码器
正弦弦 PG 卡	EC-PG102-05	Sin/Cos 型编码器
UVW 型 PG 卡	EC-PG103-05	5V 电源的 UVW 编码器
绝对值 PG 卡	EC-PG306-05	5V 绝对值 PG 卡 180°插针
	EC-PG306-05B	5V 绝对值 PG 卡 90°插针

2 增量式编码器 PG 卡

2.1 型号说明与技术指标

表 2-1 技术指标

规格型号	EC-PG301-05	EC-PG301-12	EC-PG301-24
输出	可调电压范围：4.75~7V	支持 11.75~16V 电压输出，24V±5%电压输出，最大输出	

规格型号	EC-PG301-05	EC-PG301-12	EC-PG301-24
电源	出厂设定：5V±5% 最大输出 300mA 电流	出厂值 12V±5%，最大输出 350mA 电流	出厂 300mA 电流
输入信号	支持差分、集电极开路、推挽编码器 A、B、Z 信号输入，响应速度 0~100kHz	支持差分、集电极开路、推挽编码器 A、B、Z 信号输入，响应速度 0~100kHz	支持差分、集电极开路、推挽编码器 A、B、Z 信号输入，响应速度 0~100kHz
输出信号	输出频率：0~80kHz 输出形式：差分输出、推挽输出、集电极开路输出、分频输出 范围：1~256 输出阻抗：70Ω	输出频率：0~80kHz 输出形式：差分输出、推挽输出、集电极开路输出、分频输出 范围：1~256 输出阻抗：70Ω	输出频率：0~80kHz 输出形式：差分输出、推挽输出、集电极开路输出、分频输出 范围：1~256 输出阻抗：70Ω

2.2 增量式编码器 PG 卡安装和尺寸图

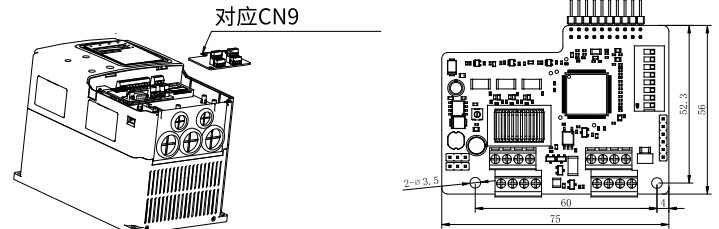


图 2-1 增量式编码器 PG 卡安装图

图 2-2 增量式编码器 PG 卡尺寸图

2.3 增量式编码器 PG 卡使用说明

2.3.1 功能

当用户使用 PG 矢量控制时，必须选用 PG 卡。PG 卡的功能包括两路正交编码器信号的处理电路并支持主定位 Z 信号输入，可以接收差分型、集电极开路型和推挽型输出的编码器信号。可以对输入的编码器信号进行分频输出，输出量为包含两路差分信号，可通过跳线 J1、J2 选择输出推挽信号与集电极开路信号，请用户根据自己的实际使用情况进行选择。

2.3.2 端子及接线说明

增量式编码器 PG 卡有 2 个 2*4P 用户接线端子，如图。

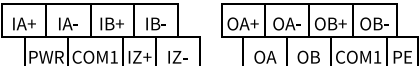


图 2-3 增量式编码器 PG 卡用户接线端子

其中，PWR、COM1 为编码器工作电源输出；IA+、IA-、IB+、IB-、IZ+、IZ-为编码器信号输入端子；OA+、OA-、OB+、OB-为 5V 差分分频信号输出端子，OA、OB、COM1 为分频推挽信号与集电极开路信号输出端子（通过跳线 J1、J2 选取输出信号形式）；增量式编码器 PG 卡的频率系数由卡上的接码开关来决定。接码开关共有 8 位，根据其表示的 2 进制数加 1 来设定频率系数，接码开关上标为“1”的为二进制低位，标为“8”的为二进制高位。当接码拨向 ON 时，该位为有效，表示“1”，相反则为“0”。频率系数见下表：

表 2-2 频率系数

十进制数	二进制数	频率系数
0	00000000	1
1	00000001	2
2	00000010	3
...	...	...
m	...	m+1
255	11111111	256

2.3.3 接线原理示意图

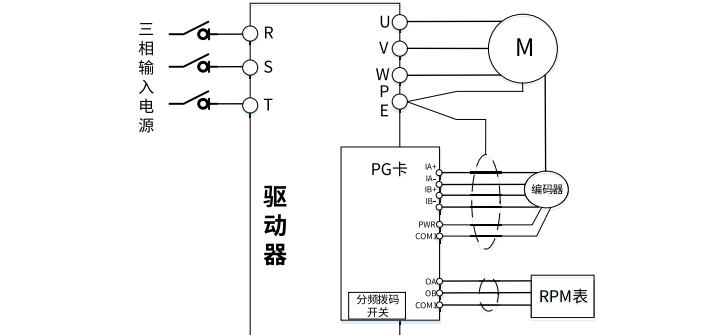


图 2-4 增量式编码器 PG 卡接线原理示意图

2.3.4 接线注意事项

- PG 卡信号线要与动力线分开，禁止平行走线；
- 为避免编码器信号受到干扰，请选用屏蔽电缆作为 PG 卡信号线；
- 编码器屏蔽电缆的屏蔽层应该接大地（如变频器 PE 端），并且一定是单端接地，以免信号受到干扰；
- PG 卡分频输出如果外接用户电源，则电压应小于 24V，否则将损坏 PG 卡；
- 用户可根据实际需求通过调整 12~15V 增量式编码器 PG 卡电位器（顺时针电压增大），设定输出电压，旋转电位器时，用力不宜过大。

2.4 应用连接

2.4.1 输入应用连接

- 差动输出编码器连接示意图

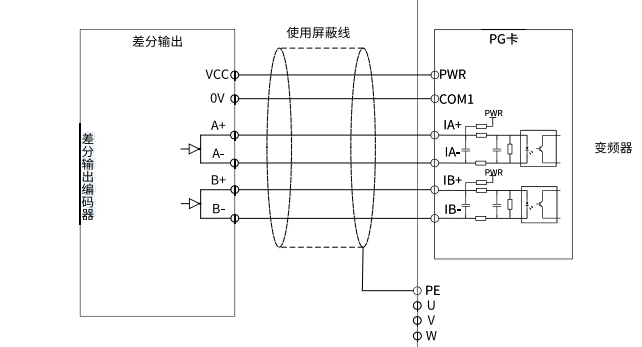


图 2-5 差动输出编码器接线图

- 开路集电极输出编码器连接示意图

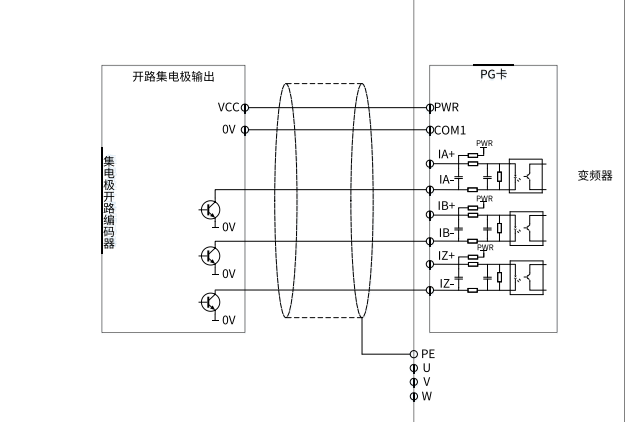


图 2-6 集电极开路输出编码器接线图

- 推挽式输出编码器连接示意图

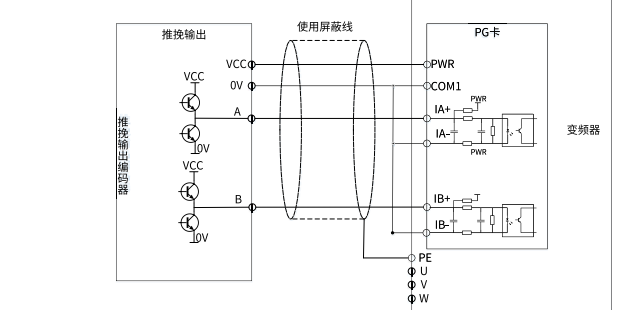


图 2-7 推挽式输出编码器接线图

- 推挽式输出编码器连接示意图

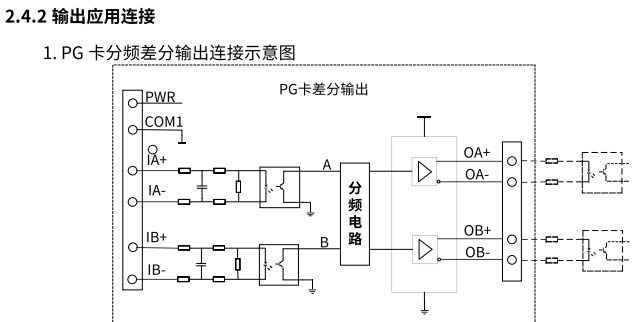


图 2-8 PG 卡分频输出接线图

- PG 卡分频集电极开路输出连接示意图

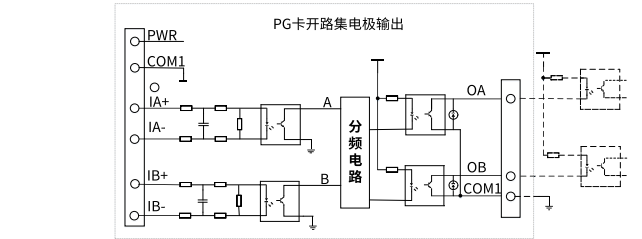


图 2-9 PG 卡分频集电极开路输出接线图

2.4 应用连接

2.4.1 输入应用连接

- 差动输出编码器连接示意图

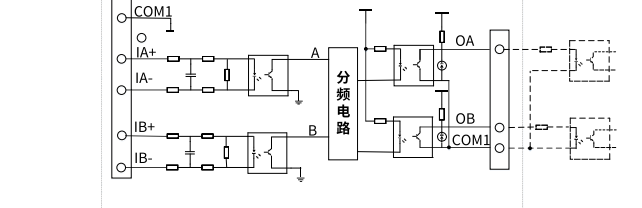


图 2-10 PG 卡分频推挽输出接线图

- 推挽输出时 J1、J2 处 PWR 分别与 HOA、HOB 短接。

- 增量型编码器 PG 卡主要应用于异步电动机闭环矢量控制。

3 正弦弦编码器 PG 卡与 UVW 型编码器 PG 卡

3.1 型号说明与技术指标

正弦弦编码器 PG 卡与 UVW 编码器 PG 卡，其规格说明见表 3-1：

表 3-1 技术参数表

规格型号	EC-PG102-05	EC-PG103-05
频率系数	1（没有分频拨码开关）	1~256（有分频拨码开关）
输出电源	可调电压范围：4.75~7V 出厂设定：5V/±5% 最大输出电流：300mA	可调电压范围：4.75~7V 出厂设定：5V/±5% 最大输出电流：300mA
输出信号	输出形式：两路正交分频差分输出，开路集电极输出 集电极开路输出阻抗：70Ω	输出形式：两路正交差分输出，开路集电极输出 集电极开路输出阻抗：70Ω

用户可根据自己的实际应用来选择输出电压大小，在编码器信号远距离传输时，用户可通过电位器调节输出电压（调节方式与增量式编码器卡一致），以增加接线距离。

3.2 正弦弦编码器 PG 卡安装和尺寸图

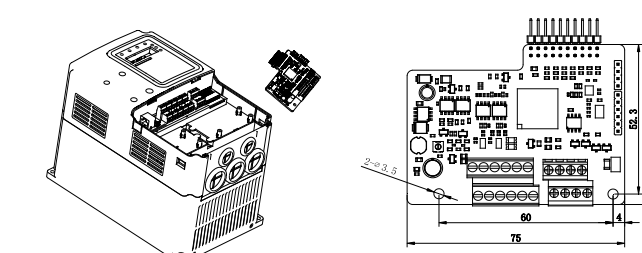


图 3-1 正弦弦编码器 PG 卡安装图

图 3-2 正弦弦编码器 PG 卡尺寸图

3.3 UVW 编码器 PG 卡安装和尺寸图

图 3-3 UVW 编码器 PG 卡安装图

图 3-4 UVW 编码器 PG 卡尺寸图

图 3-5 正弦 PG 卡接线口和接线端子

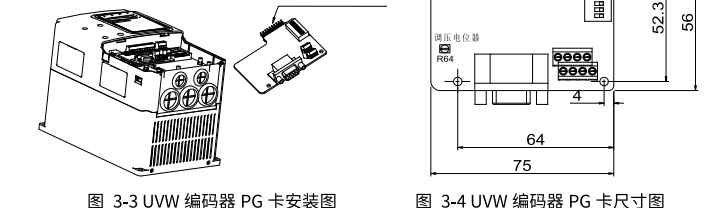


图 3-6 UVW 编码器 PG 卡接线口和接线端子

- PG 卡分频集电极开路输出连接示意图

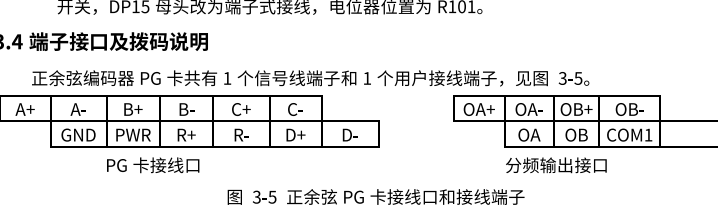


图 3-7 UVW 编码器 PG 卡接线口和接线端子

- PG 卡分频集电极开路输出连接示意图

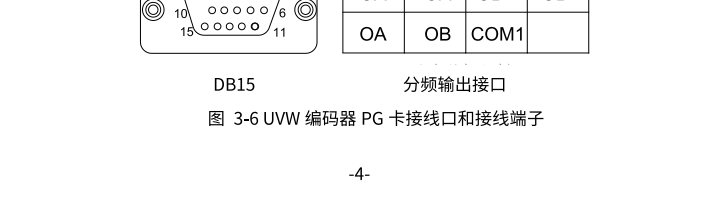


图 3-8 UVW 编码器 PG 卡接线口和接线端子

OA+、OA-、OB+、OB-为差分输出信号端子（LVDS 差分电平），OA、OB、COM1 为集电极开路信号输出端子。

3.2 PG 卡分频推挽输出连接示意图

- PG 卡内部没有将 PE 接地，用户使用时可自行接地。
- 正弦弦编码器 PG 卡、UVW 编码器 PG 卡，输出信号接线方式与增量式编码器 PG 卡一致，但不支持推挽输出。

DB15 三母头接口为编码器的信号输入接口，PG 卡接口信号排列顺序对照表 3-2：

表 3-2 DB15 接口信号排列顺序对照表

PG 卡接口	UVW
5	A+
6	A-
8	B+
9	B-
3	Z+
4	Z-
11	U+
10	U-
12	V+
13	V-
9	PWR
7	GND
14	W
15	W-
2	空

当应用 UVW PG 卡时，只需把 UVW 编码器的信号排列与 UVW 编码器 PG 卡信号排列相对应的 DB15 公头插入 PG 卡 DB15 母头中即可。

UVW 型编码器 PG 卡的频率系数设定与增量型编码器一样，频率系数见表 2-2。

- 注意：UVW 编码器 PG 卡，可支持 5V 增量型编码器差分信号处理，输入接线方式与增量型编码器 PG 卡一致，主要应用到接线端口为 DB15 上的 A、B、Z、PWR 与 GND 端口。

4 绝对值编码器 PG 卡

4.1 型号说明与技术指标

绝对值编码器 PG 卡（主要适用 ECN1313，ECN413 编码器），其规格说明见表 4-1：

表 4-1 技术参数表

规格型号	EC-PG306-05
频率系数	1~4（通过插接排针 J2 的短路帽实现）
输入信号	支持两路差分 A、B（正弦信号，1Vpp）输入，响应速度 0~50kHz；支持 Endat2.1 协议传送绝对位置值信号，故障等信息
输出电源	可调电压范围：4.75~7V 出厂设定：5V/±5% 最大输出电流：300mA
输出信号	输出形式：两路正交分频差分输出（LVCMOS 电平），开路集电极输出 集电极开路输出阻抗：70Ω

4.2 绝对值编码器 PG 卡安装和尺寸图

图 4-1 绝对值编码器 PG 卡安装图

图 4-2 绝对值编码器 PG 卡尺寸图

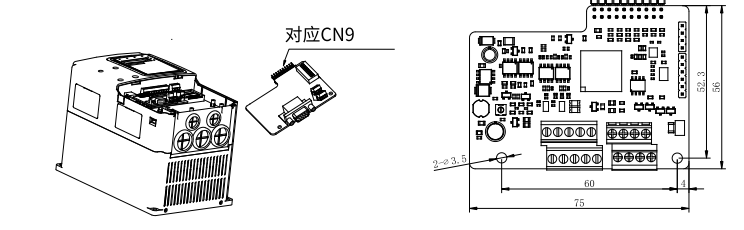
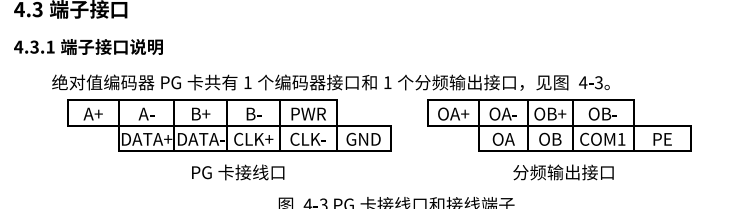


图 4-3 PG 卡接线口和接线端子

- PG 卡分频集电极开路输出连接示意图



- PG 卡分频集电极开路输出连接示意图

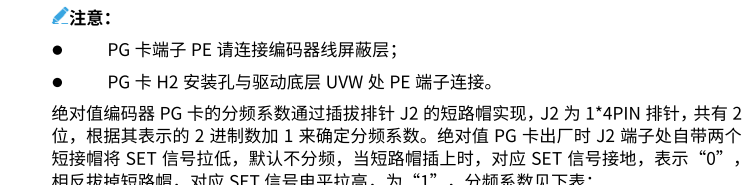


图 4-4 绝对值编码器 PG 卡接线原理示意图

- PG 卡信号线要与动力线分开，禁止平行走线；
- 为避免编码器信号受到干扰，请选用屏蔽电缆作为 PG 卡信号线；
- 编码器屏蔽电缆的屏蔽层应该接大地（如变频器 PE 端），并且一定是单端接地，以免信号受到干扰；
- PG 卡分频输出如果外接用户电源，则电压应小于 24V，否则将损坏 PG 卡；
- 用户可根据实际需求通过调整 12~15V 增量式编码器 PG 卡电位器（顺时针电压增大），设定输出电压，旋转电位器时，用力不宜过大。

4.3 接线注意事项

- PG 卡信号线要与动力线分开，禁止平行走线；
- 为避免编码器信号受到干扰，请选用屏蔽电缆作为 PG 卡信号线；
- 编码器屏蔽电缆的屏蔽层应该接大地（如变频器 PE 端），并且一定是单端接地，以免信号受到干扰；
- PG 卡分频输出如果外接用户电源，则电压应小于 24V，否则将损坏 PG 卡；
- 用户可根据实际需求通过调整绝对值编码器 PG 卡电位器（顺时针电压增大），设定输出电压，旋转电位器时，用力不宜过大。

4.3.2 接线原理示意图

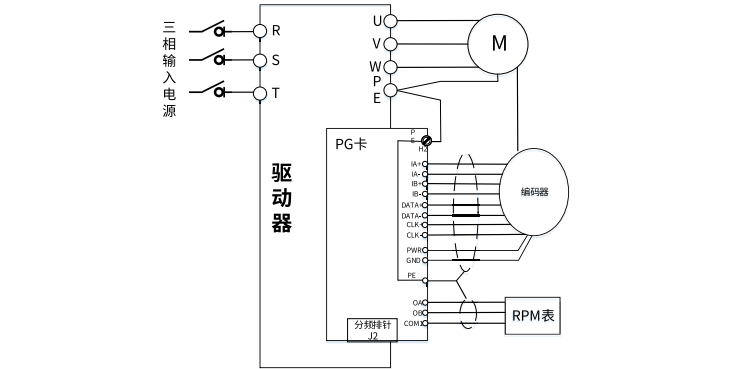


图 4-4 绝对值编码器 PG 卡接线原理示意图

4.3.3 接线注意事项

- PG 卡信号线要与动力线分开，禁止平行走线；
- 为避免编码器信号受到干扰，请选用屏蔽电缆作为 PG 卡信号线；
- 编码器屏蔽电缆的屏蔽层应该接大地（如变频器 PE 端），并且一定是单端接地，以免信号受到干扰；
- PG 卡分频输出如果外接用户电源，则电压应小于 24V，否则将损坏 PG 卡；
- 用户可根据实际需求通过调整绝对值编码器 PG 卡电位器（顺时针电压增大），设定输出电压，旋转电位器时，用力不宜过大。

5 调试说明

5.1 相关功能码（以 GD300L 为例）

为了便于功能码的设定，在使用键盘进行操作时，功能组号对应一级菜单，功能码号对应二级菜单，功能码参数对应三级菜单。

功能表的各列内容说明如下：

- 第 1 列“功能码”：为功能参数组及参数的编号；
- 第 2 列“名称”：为功能参数的完整名称；
- 第 3 列“参数详细说明”：为该功能参数的详细描述；当进行恢复缺省参数操作时，功能码参数被刷新后恢复出厂值；但实际检测的参数值或记录值，则不会被刷新；
- 第 4 列“缺省值”：为功能参数的出厂原始设定值；
- 第 5 列“更改”：为功能参数的更改属性（即是否允许更改和更改条件），说明如下：
 - “○”：表示该参数的设定值在变频器处于停机、运行状态中，均可更改；
 - “●”：表示该参数的设定值在变频器处于运行状态时，不可更改；
 - “●”：表示该参数的数值是实际检测记录值，不能更改。

功能码	名称	参数详细说明	缺省值	更改
P00 组 基本功能码				
P00.00	速度控制模式	0: 无 PG 矢量控制 1: 有 PG 矢量控制 2: V/F 控制 3: 闭环矢量控制	2	●
P00.01	运行指令通道	0: 键盘指令通道 (LED 熄灭) 1: 端子指令通道 (LED 闪烁) 2: 通讯指令通道 (LED 点亮) 3: CAN 指令通道 (LED 点亮)	1	●
P00.02	速度指令选择	0: 键盘设定 1: 模拟量 AI1 设定 2: 模拟量 AI2 设定 3: 多段速运行设定 4: 远程通讯设定 5: 模拟量 AI1 跟踪运行 6: CAN 通讯给定 7: CAN 给定跟随运行	3	●
P00.04	最大输出频率	10.00~600.00Hz	50.00Hz	●
P00.05	键盘设定速度	0m/s~P00.02 (电梯额定速度)	1.500m/s	○
P00.09	电机参数自学习	0: 无操作 1: 异步机空载旋转参数自学习 2: 异步机静止参数自学习 3: 同步机空载旋转自学习 4: 同步机静止自学习 5: 同步机带载旋转自学习	0	●
P00.10	功能参数恢复	0: 无操作 1: 恢复缺省值 2: 清除故障档案 3: 回溯功能参数：读取功能参数，	0	●

5.2 调试举例

- 异步机闭环矢量调试步骤
 - 设置 P00.10=1，恢复出厂参数设置
 - 设置 P00.00=3，P00.03=3 及 P02 组电机铭牌参数
 - 验证编码器安装及设置是否正确可缓慢旋转电机或手动缓慢转动电机，观测 P17.21（当编码器为旋变时）值应该是 0~359.9 递增或递减均匀变化，这表明编码器接线正确。
- 同步机闭环矢量控制调试步骤
 - 设置 P00.10=1，恢复出厂参数设置
 - 设置 P00.00=3（闭环矢量控制），设置 P00.03=3，P00.04，及 P2 组电机铭牌参数
 - 设置 P2.00，P2.01 编码器参数当编码器为旋变变频器时，请设定编码器脉冲数为（旋变极对数*1024），如 4 对极旋变，应设置 P2.01=4096。
 - 验证编码器安装及设置是否正确
 - 可缓慢旋转电机，观测 P17.21（当编码器为旋变时）值应该是 0~359.9 递增或递减均匀变化，这表明编码器接线正确。



EC-PG Series PG Expansion Module

User Manual

Preface

Thank you for choosing INVT EC-PG series PG expansion module.

The EC-PG series PG expansion module is used to detect information transmitted by different types of encoders and is compatible with elevator products such as the EC160 series integrated controller, as well as GD300L, GD390L variable frequency drives(VFDs). The expansion module monitors the rotational speed of the motor by detecting the output signal of the encoder, providing real-time speed feedback for precise speed control.

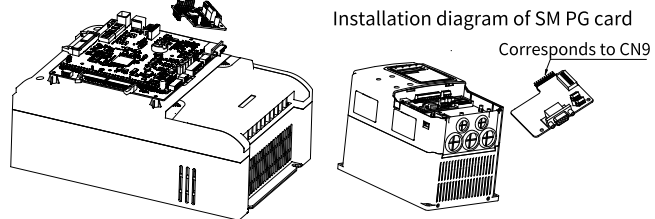
This manual provides the product overview, installation, wiring, and commissioning instructions. To ensure safe and proper use of the product and to maximize its performance, please carefully read the manual before installation.

Product features

- Multi-channel signal detection for different types of encoders
- Provides power supply for encoders: 5V±5%, 12V±5%, or 24V±5%/300mA (see detailed specifications for each PG card)
- Supports multiple input signal types (see detailed specifications for each PG card)
- Supports pulse input and frequency division output
- Features detection of encoder disconnection to prevent system fault escalation
- Utilizes digital filtering technology to enhance electromagnetic compatibility and achieve stable long-distance reception of encoder signals

1 Product overview

1.1 Model definition



EC - PG 1 01 - 05 B
① ② ③ ④ ⑤ ⑥

Symbol	Field	Example
①	Product category	EC: Expansion card
②	Board card category	PG: PG card
③	Technology version	Indicates the generation of a technical version by using odd numbers, for example, 1, 3, and 5 indicate the 1st, 2nd, and 3rd generations of the technical version.
④	Code	01: Incremental encoder PG card 02: Sin/Cos encoder PG card 03: UVW encoder PG card 04: Resolver PG card 05: Incremental encoder PG interface + pulse direction reference 06: Absolute encoder PG card interface 00: No power (passive) 05: 5V 12: 12~15V 24: 24V
⑤	Working power supply	Differences in inter-board interface forms are reflected by version, with version A being the default and not explicitly marked, followed by versions B, C, D, ...
⑥	Version	

1.2 Product specifications

PG card type	Model	Specification
Incremental PG card	EC-PG301-05B	5V incremental PG card with 180° pin header 5V push-pull, open collector, and differential output incremental encoder
	EC-PG301-12B	12V incremental PG card with 180° pin header 12V push-pull, open collector, and differential output incremental encoder
	EC-PG301-12D	12V incremental PG card with 90° pin header 12V push-pull, open collector, and differential output incremental encoder
	EC-PG301-24B	24V incremental PG card with 180° pin header 24V push-pull, open collector, and differential output incremental encoder
Sin/Cos PG card	EC-PG102-05	Sin/Cos encoder
UVW-type PG card	EC-PG103-05	5V-powered UVW encoder
Absolute PG card	EC-PG306-05	5V absolute PG card with 180° pin header 5V absolute encoder
	EC-PG306-05B	5V absolute PG card with 90° pin header 5V absolute encoder

2 Incremental encoder PG card

2.1 Model description and technical parameters

Model	EC-PG301-05	EC-PG301-12	EC-PG301-24
Output power supply	Adjustable voltage range: 4.75~7V Default setting: 5V±5% Max. output current: 300mA	Supporting the voltage output of 11.75~16V. Default: 12V±5%. Max. output current: 350mA	Voltage output: 24 V±5% Max. output current: 300mA
Input signal	Supporting the A, B, and Z signal inputs of differential, open collector, and push-pull encoders. Response speed: 0~100kHz	Supporting the A, B, and Z signal inputs of differential, open collector, and push-pull encoders. Response speed: 0~100kHz	Supporting the A, B, and Z signal inputs of differential, open collector, and push-pull encoders. Response speed: 0~100kHz
Output signal	Output frequency: 0~80kHz Output mode: Differential output, push-pull output, open collector output, and frequency-divided output Range: 1~256 Output impedance: 70Ω	Output frequency: 0~80kHz Output mode: Differential output, push-pull output, open collector output, and frequency-divided output Range: 1~256 Output impedance: 70Ω	Output frequency: 0~80kHz Output mode: Differential output, push-pull output, open collector output, and frequency-divided output Range: 1~256 Output impedance: 70Ω

2.2 Installation and dimensions

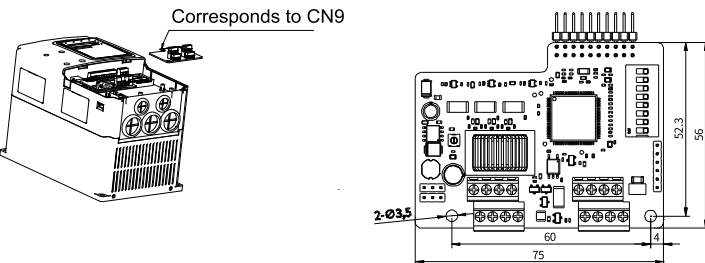


Figure 2-1 Incremental encoder PG card installation diagram

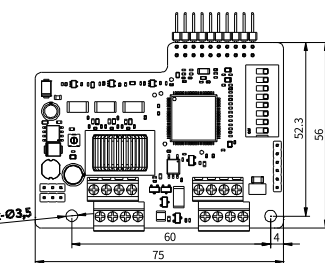


Figure 2-2 Incremental encoder PG card dimension drawing

2.3 Incremental encoder PG card use instructions

2.3.1 Function

A PG card is a must for PG vector control. The PG card functions include processing circuits for two quadrature encoder signals and supporting spindle positioning Z signal inputs, and receiving signals of differential, open collector and push-pull encoder. Frequency-divided output can be performed for the input encoder signals. The output quantity includes two channels of differential signals. You can choose to output push-pull signals or open collector signals through jumper J1 or J2 according to your actual use.

2.3.2 Terminal and switch description

The incremental encoder PG card has two 2*4P user wiring terminals. See Figure 2-3.

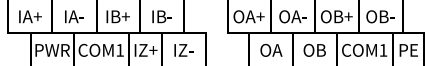


Figure 2-3 Wiring terminals of incremental encoder PG card

PWR and COM1 are for encoder working power output; IA+, IA-, IB+, IB-, IZ+, and IZ- are encoder signal input terminals; OA+, OA-, OB+, OB- are 5V differential crossover signal output terminals, while OA, OB, and COM1 are frequency-divided push-pull signal and open collector signal output terminals (the output signal type is selected by jumper J1 or J2).

The frequency division coefficient of the incremental encoder PG card is determined by the switch on the card. The switch has 8 bits, and the frequency division coefficient is determined by adding 1 to the binary number that the switch represents. The place labeled with "1" is the low binary bit, and the one labeled with "8" is the high binary bit. When the switch is turned to ON, the bit is valid, indicating "1"; otherwise, the bit indicates "0". See the following table for frequency division coefficients.

Decimal	Binary	Frequency division coefficient
0	00000000	1
1	00000001	2
2	00000010	3
...	...	...
m	...	m+1
255	11111111	256

2.3.3 Wiring principles

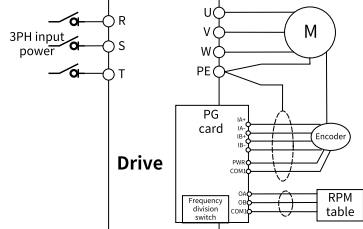


Figure 2-4 Wiring diagram of incremental encoder PG card

2.3.4 Wiring precautions

- A PG card signal line and a power line must be routed separately and disallow parallel routing.
- To avoid interference from encoder signals, use a shielded cable for the PG card signal line.
- The shield layer of the encoder shield cable should be connected to the earth (such as the PE of VFD), and it must be connected to earth only at one end to avoid signal interference.
- If the PG card uses frequency-divided output when connecting to an external power supply, the voltage should be less than 24V; otherwise the PG card will be damaged.
- You can set the output voltage by adjusting the 12~15V incremental encoder PG card potentiometer (clockwise for voltage increases) according to actual needs, and the force should not be too great when rotating the potentiometer.

2.4 Application connection

2.4.1 Input application connection

① Differential output encoder connection

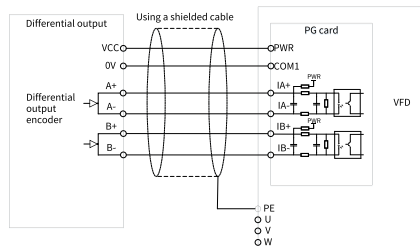


Figure 2-5 Wiring diagram of differential output encoder

② Open collector output encoder connection

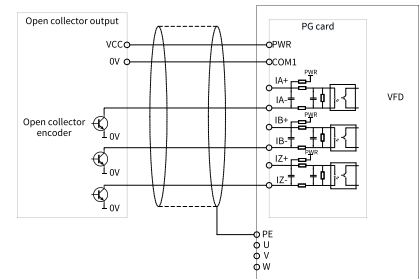


Figure 2-6 Wiring diagram of open collector output encoder

③ Push-pull output encoder connection

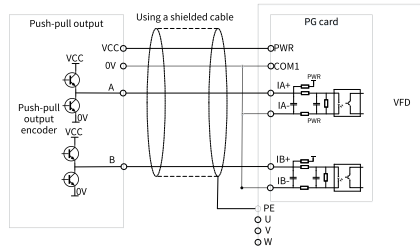


Figure 2-7 Wiring diagram of push-pull output encoder

Note: When the spindle positioning VFD is supported, the Z signal needs to be connected, of which the wiring method is similar to that for the A and B signals.

2.4.2 Output application connection

① PG card frequency-divided differential output connection

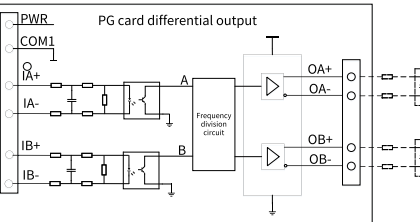


Figure 2-8 Wiring diagram of PG card frequency-divided output

② PG card frequency-divided open collector output connection

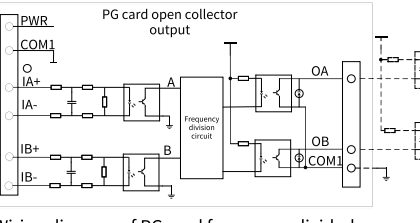


Figure 2-9 Wiring diagram of PG card frequency-divided open collector output

Note: During open collector output, PWR at J1 and that at J2 are short connected to COA and COB.

③ PG card frequency-divided push-pull output connection

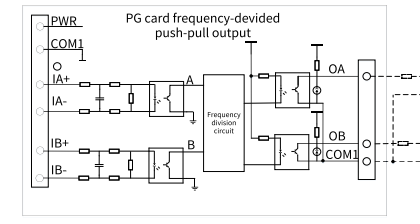


Figure 2-10 Wiring diagram of PG card frequency-divided push-pull output

Note:

- During push-pull output, PWR at J1 and that at J2 are short connected to HOA and HOB.
- Incremental encoder PG cards are mainly used to closed-loop vector control on asynchronous motors.

3 Sin/Cos encoder and UVW encoder PG card

3.1 Model description and technical parameters

See Table 3-1 for the specifications of Sin/Cos encoder and UVW encoder PG cards.

Model	EC-PG102-05	EC-PG103-05
Frequency division coefficient	1 (Without a frequency-division switch)	1~256 (With frequency-division switch)
Output power supply	Adjustable voltage range: 4.75~7V Default setting: 5V±5% Max. output current: 300mA	Adjustable voltage range: 4.75~7V Default setting: 5V±5% Max. output current: 300mA
Output signal	Output form: Two quadrature frequency division differential outputs, and one open collector output Open collector output impedance: 70Ω	Output form: Two quadrature frequency division differential outputs, and one open collector output Open collector output impedance: 70Ω

You can choose the output voltage value according to the actual application. When the encoder signal is transmitted at a long distance, you can adjust the output power supply voltage by potentiometer (the regulation method is the same as incremental encoder card) to increase the wiring distance.

3.2 Installation and dimensions of Sin/Cos encoder PG card

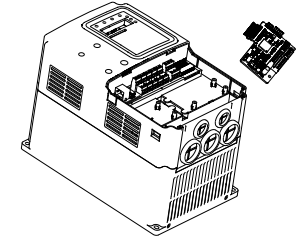


Figure 3-1 Sin/Cos encoder PG card installation diagram

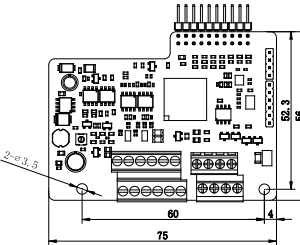


Figure 3-2 Sin/Cos encoder PG card dimension drawing

3.3 Installation and dimensions of UVW encoder PG card

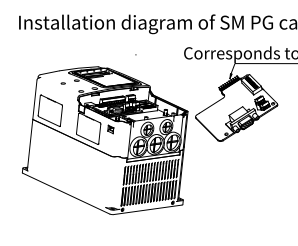


Figure 3-3 UVW encoder PG card installation diagram

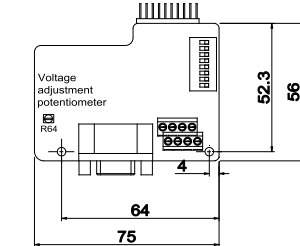


Figure 3-4 UVW encoder PG card dimension drawing

Note:

- The UVW encoder PG card is installed in the same way and position as the incremental encoder PG card. It corresponds to a double row of 2 x 10 pins.
- The Sin/Cos encoder PG card has the same size and mounting method as the UVW encoder PG card, except that it does not have a switch for frequency division, the DP15 female connector is replaced with terminal wiring, and the potentiometer position is R101.

3.4 Terminal interfaces and switch description

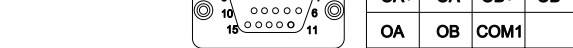
The Sin/Cos encoder PG card has one signal line terminal and one user terminal, as shown in Figure 3-5.



Figure 3-5 Wiring interface and terminals of the Sin/Cos PG card

Same as the Sin/Cos encoder PG card, the UVW encoder PG card has one encoder signal interface and one frequency-divided output interface, as shown in the Figure 3-6.

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DB15 Frequency-divided output interface

Figure 3-6 Ports and terminals of PG card

OA+, OA-, OB+, and OB- are differential output signal terminals (LVDS differential level), while OA, OB, and COM1 are open collector signal output terminals.

Note:

- The PG card does not internally connect the PE to the earth, and you can connect the PE to the earth during use.
- The Sin/Cos encoder PG card and UVW encoder PG card have the similar output signal wiring method as the incremental encoder PG card, but they do not support push-pull output.

The DB15 three-row female interface is the encoder signal input interface. Table 3-2 shows the PG card interface signal arrangement sequence.

PG card interface	Sin/Cos	UVW
5	A+	A+
6	A-	A-
8	B+	B+
1	B-	B-
3	R+	Z+
4	R-	Z-
12	D+	V+
13	D-	V-
9	PWR	PWR
7	GND	GND
14	Empty	W
15	Empty	W-
2	Empty	Empty

When applying either of the UVW PG card, you only need to insert the DB15 male connector of the UVW encoder into the DB15 female connector of the PG card.

Setting the frequency division coefficient of a UVW encoder PG card is similar to that for an incremental encoder PG card. For details about frequency division coefficients, see Table 2-2.

Note: UVW encoder PG cards can support 5V incremental encoders with differential signal processing, have the similar wiring method with that for incremental encoder PG cards, and mainly use wiring ports including the A, B, Z, PWR, and GND ports on DB15.

Absolute encoder PG card

4.1 Model description and technical parameters

See Table 4-1 for the specifications of absolute encoders PG card (mainly applicable to ECN1313, ECN413 encoders).

Model	EC-PG306-05
Frequency division coefficient	1~4 (set via jumper cap on pin header J2)
Input signal	Supports two differential A and B (sine signal, 1Vpp) inputs with the response speed of 0~50kHz; Supports the transmission of absolute position value signal, fault and other information in Endat2.1 protocol.
Output power supply	Adjustable voltage range: 4.75~7V Default setting: 5V±5% Max. output current: 300mA
Output signal	Output form: Two quadrature frequency division differential outputs (LVCMOS electrical level), and one open collector output Open collector output impedance: 70Ω

4.2 Installation and dimensions

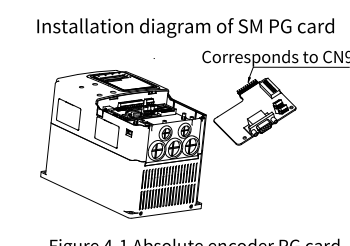


Figure 4-1 Absolute encoder PG card installation diagram

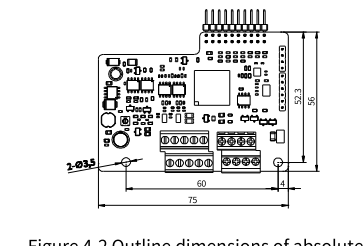


Figure 4-2 Outline dimensions of absolute encoder PG card

Note: The absolute encoder PG card is installed in the same way and position as the UVW encoder PG card. It corresponds to a double row of 2 x 10 pins.

4.3 Terminal interfaces

4.3.1 Interface description

The absolute encoder PG card has one encoder interface and one frequency-divided output interface, as shown in Figure 4-3.



Figure 4-3 Ports and terminals of PG card

EC-PG Series PG Expansion Module User Manual

OA+, OA-, OB+, and OB- are differential output (LVCMOS) signal terminals, while OA, OB, and COM1 are open collector signal output terminals.

Note:

- Connect the PG card terminal PE to the encoder cable shield layer.
- The H2 mounting hole of the PG card should be connected to the PE terminal at the UVW base of the drive.

The frequency division coefficient of the absolute encoder PG card is set by plugging or unplugging the jumper caps on the J2 pin header. J2 is a 1×4PIN header with two positions, and the frequency division coefficient is determined by the binary value represented by the jumper positions plus one. The absolute PG card comes with two jumper caps on the J2 terminal that pull the SET signals low by default (no frequency division). When a jumper cap is plugged in, the corresponding SET signal is grounded, representing "1"; when the jumper is removed, the SET signal is pulled high, representing "1". The frequency division coefficient is shown in the following table:

SET1	SET2	Decimal	Binary	Frequency division coefficient
0	0	0	00	1
0	1	1	01	2
1	0	2	10	3
1	1	3	11	4

4.3.2 Wiring principles

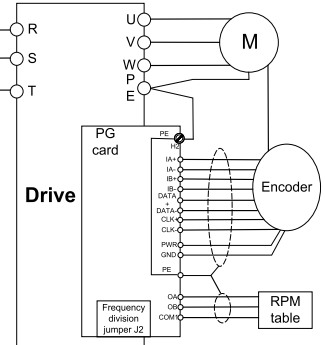


Figure 4-4 Wiring diagram of absolute encoder PG card

4.3.3 Wiring precautions

- A PG card signal line and a power line must be routed separately and disallow parallel routing.
- To avoid interference from encoder signals, use a shielded cable for the PG card signal line.
- The shield layer of the encoder shield cable should be connected to the earth (such as the PE of VFD), and it must be connected to earth only at one end to avoid signal interference.
- If the PG card uses frequency-divided output when connecting to an external power supply, the voltage should be less than 24V; otherwise the PG card will be damaged.
- You can set the output voltage by adjusting the absolute encoder PG card potentiometer (clockwise for voltage increases) according to actual needs, and the force should not be too great when rotating the potentiometer.

5 Commissioning

5.1 Function codes related (taking GD300L as an example)

The function group numbers correspond to the level-1 menus, the function codes correspond to the level-2 menus, and the function parameters correspond to the level-3 menus.

The function code table contains:

Column 1 "Function code": Code of the function group and parameter.

Column 2 "Name": Full name of the function parameter.

Column 3 "Default": Factory setting of the function parameter. If the value of the parameter is detected or recorded, the value cannot be restored to the factory setting.

Column 4 "Default": Initial value set in factory.

Column 5 "Modify": Whether the function parameter can be modified, and conditions for the modification.

"○" indicates that the value of the parameter can be modified when the VFD is in stopped or running state.

"●" indicates that the value of the parameter cannot be modified when the VFD is in running state.

"●" indicates that the value of the parameter is detected and recorded, and cannot be modified.

Function code	Name	Description	Default	Modify
Group P00 Basic functions				
P00.00	Speed control mode	0: Sensorless vector control (SVC) 1: Feedback vector control (FVC) 2: V/F control 3: Closed-loop vector control	2	○
P00.01	Channel of running commands	0: Keypad (the indicator is off) 1: Terminal (the indicator blinks) 2: Communication (the indicator is on) 3: CAN (the indicator is on)	1	○
P00.02	Rated speed of the lift	0.100~4.000m/s	1.500m/s	○

Function code	Name	Description	Default	Modify
P00.03	Speed command selection	0: Keypad 1: AI1 2: AI2 3: Multi-step speed running 4: Remote communication 5: AI1 tracking running 6: CAN communication-based setting 7: CAN communication-based reference	3	⊙
P00.04	Max. output frequency	10.00~600.00Hz	50.00Hz	⊙
P00.05	Speed set through keypad	0m/s~P00.02 (rated lift speed)	1.500m/s	○
P00.09	Motor parameter autotuning	0: No operation 1: Rotating parameter autotuning on empty-load asynchronous motor 2: Static parameter autotuning on asynchronous motor 3: Rotating parameter autotuning on empty-load synchronous motor 4: Static parameter autotuning on synchronous motor 5: Rotating parameter autotuning on synchronous motor with load	0	⊙
P00.10	Function parameter restoration	0: No operation 1: Restore default values 2: Clear fault records 3: Roll back function parameters, reading function parameters that are saved when the LSB of P07.01 is set to 5.	0	⊙