ZO+

增量式 PG 扩展卡快速使用指南

本手册简要介绍了增量式 PG 扩展卡的产品信息、安装与接线。 扫描二维码,查阅完整电子 拨打服务热线 400-700-9997 或访问 www.invt.com.cn 获取更 说明书。 多信息及资源下载。保修条款详见完整版电子说明书。



增量式 PG 扩展卡快速使用指南

感谢您使用英威腾增量式 PG 扩展卡!

增量式 PG 扩展卡是多款通用变频器系列 PG 卡,需与 GD350 等系列变频器配合使用,通过增量 式信号与编码器连接,包括 EC-PG505-12、 EC-PG505-24B、 EC-PG507-12 和 EC-PG507-24

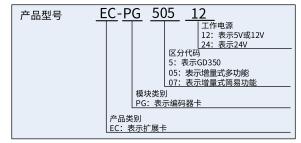
产品特点:

- 支持编码器供电。
- 支持多功能系列,包括编码器输入、脉冲给定输入和分频输出(仅 EC-PG505-12 和 EC-PG505-24B 支持)。
- 支持简易功能系列,包括编码器输入(仅 EC-PG507-12 和 EC-PG507-24 支持)。
- 支持差分接法、集电极开路接法和推挽接法。
- 支持编码器输入差分接法硬件断线检测,搭配控制板可支持闭环转开环功能。
- 支持分频输出串联或并联。
- PE 端子,每张卡 PE 端子必须可靠接地。

1 产品信息

1.1 型号说明

图 1-1 产品铭牌和型号



1.2 规格参数

表 1-1 规格参数

指标
-10~50°C
-20~60°C
5%~95%(无凝结)
无腐蚀性气体
卡槽加螺钉固定
IP00
自然风冷

1.3 产品结构

成品卡包含成品板,无外壳结构。

1.4 指示灯

表 1-2 指示灯功能介绍

指示灯位号	定义	功能
LED1	信号灯	闪烁(亮 500ms,灭 500ms): 编码器旋转时,A1/B1 任一信号断线
2231	1	亮: 其他情况
PWR	电源灯	亮: 扩展卡通电
1 111		灭: 扩展卡未通电
	状态灯	亮:扩展卡与控制板正在建立连接
ST		闪烁(亮 500ms,灭 500ms):扩展卡与控制板连接正常
		灭: 扩展卡与控制板断开连接
DD.	MC 147	亮: 编码器输入差分信号断线
BR	断线灯	灭:编码器输入差分信号未断线

1.5 功能选择

表 1-3 功能选择

成品卡型号	名称	功能
EC-PG505-12	多功能增量式 PG 卡 5V12V	编码器输入+脉冲给定+分频输出
EC-PG505-24B	多功能增量式 PG 卡 24V	编码器输入+脉冲给定+分频输出
EC-PG507-12	简易增量式 PG 卡 5V12V	编码器输入
EC-PG507-24	简易增量式 PG 卡 24V	编码器输入

1.6 扩展卡参数

		表 1-4 扩展卡参数说明
型号	功能	规格参数
	供电电源	电压5V/12V±5%,最大输出150mA,通过跳线帽CN9 选择电压等级,根据所使用编码器的电压等级进行选择
	编码器输入	 支持 5V/12V 推挽接口 支持 5V/12V 集电极开路接口 支持 5V 差分接口,支持差分接法断线检测功能 频率响应400kHz
EC-PG505-12	脉冲给定	支持 5V/12V 推挽接口支持 5V/12V 集电极开路接口支持 5V 差分接口频率响应400kHz
	分频输出	◆ 5V差分输出◆ 支持1~255分频,通过P20.16或P24.16设置◆ 支持分频输出源选择,通过P20.17或P24.17设置
EC-PG505-24B	供电电源	电压 24V±5%,最大输出电流 150mA
	编码器输入	● 支持24V推挽接口 ● 支持24V集电极开路接口 ● 支持24V集电极开路接口 ● 支持24V差分接口,支持差分接法断线检测功能 ● 频率响应400kHz
	脉冲给定	
	分频输出	● 支持集电极开路输出,输入端外接上位电阻 ● 支持1~255分频,通过P20.16或P24.16设置 ● 支持分频输出源选择,通过P20.17或P24.17设置
	供电电源	电压 5V/12V±5%,最大输出 150mA,通过跳线帽 CN9 选择电压等级,根据所使用编码器的电压等级进行选择
EC-PG507-12	编码器输入	支持5V/12V推挽接口 支持5V/12V集电极开路接口 支持5V差分接口,支持差分接法断线检测功能 频率响应400kHz
	脉冲给定	不支持
	分频输出	不支持
	供电电源	电压 24V±5%,最大输出电流 150mA
EC-PG507-24	编码器输入	● 支持24V推挽接口 ● 支持24V集电极开路接口 ● 支持24V差分接口,支持差分接法断线检测功能 ● 频率响应400kHz
	脉冲给定	不支持

2 安装与接线

2.1 安装注意事项

安装前请先对变频器断电。

分频输出 不支持

╱注意: 根据《扩展卡安装位置卡槽位置规范》,对于支持 3 个卡槽的变频器扩展卡推荐安装在 SOLT2;对于仅支持2个卡槽的变频器扩展卡推荐安装在SOLT1。

安装所需工具: 十字螺丝刀 PH1; 一字螺丝刀 SL3。

表 2-1 螺丝扭矩要求

螺丝规格	紧固力矩
M3	0.55 N ⋅ m

2.2 产品尺寸

扩展卡尺寸为 108.5×39mm,如图 2-1 所示。



2.3 安装说明

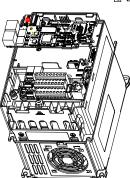
下面以插槽 3 安装为例进行说明(如图 b 所示)。

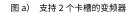
步骤1 将扩展卡置于控制板扩展插槽3的相应位置,对准插槽后扣合。

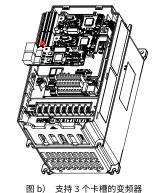
步骤2 将扩展卡通过定位柱导向定位。

步骤3 固定 M3 螺丝,安装完成。

图 2-2 安装位置示意







- 扩展卡与控制板通过插槽实现电气连接,请务必安装到位。
- 为保证扩展卡的可靠运行和 EMC 需求,请将螺丝按照推荐的扭矩进行紧固连接,确保可靠接

2.4 拆卸说明

与 2.3 安装说明步骤相反。

步骤1 断开电源,拆解所有与扩展卡连接的线缆。

步骤2 用十字螺丝刀拆卸扩展卡的接地螺钉。

步骤3 将扩展卡向外拉出,放入合适位置处。

2.5 用户接线端子

表 2-2 EC-PG505-12 端子定义

PE	AO+	BO+	ZO+	A1+	B1+	Z1+	A2+	B2+	Z2+	PWR
GND	AO-	BO-	ZO-	A1-	B1-	Z1-	A2-	B2-	Z2-	PGND

表 2-3 EC-PG505-12 端子功能定义

信号名	端口说明	端子功能描述
PE	接地端子	连接大地,增强抗干扰性能。
PWR		● 电压5V/12V±5%,最大输出150mA,通过跳线帽CN9选择
PGND	编码器电源	电压等级,根据所使用编码器的电压等级进行选择
GND	3#HP161-10///	● GND为信号地(实际为AGND),编码器输入和脉冲给定参 考地PGND,分频输出为差分信号
A1+		
A1-		● 支持5V/12V推挽接口
B1+	编码器输入	● 支持5V/12V集电极开路接口
B1-	5冊10月667月ノへ	● 支持5V差分接口,支持差分接法断线检测功能
Z1+		● 频率响应400kHz
Z1-		
A2+		
A2-		● 支持5V/12V推挽接口
B2+	脉冲给定	● 支持5V/12V集电极开路接口
B2-	IJAV I PLIAL	● 支持5V差分接口
Z2+		● 频率响应400kHz
Z2-		
AO+		
AO-		5V差分输出
BO+	分频输出	● 支持1~255分频,通过P20.16或P24.16设置
BO-	73 9% ftil CI	● 支持分频输出源选择,通过P20.17或P24.17设置
ZO+		- 人为为人而出源之开,是是12011为1211100直
ZO-		

表 2-4 EC-PG505-24B 端子定义

PE	AO+	BO+	ZO+	A1+	B1+	Z1+	A2+	B2+	Z2+	PWR
GND				A1-	B1-	Z1-	A2-	B2-	Z2-	PGND

表 2-5 EC-PG505-24B 端子功能定义

信号名	端口说明	端子功能描述					
PE	接地端子	连接大地,增强抗干扰性能					
PWR		● 电压24V±5%,最大输出电流150mA					
PGND	编码器电源	● GND为信号地,编码器输入和脉冲给定参考地PGND,分频					
GND		输出参考地GND					
A1+							
A1-		● 支持24V推挽接口					
B1+	编码器输入	● 支持24V集电极开路接口					
B1-	細切器制入	● 支持24V差分接口,支持差分接法断线检测功能					
Z1+		● 频率响应400kHz					
Z1-							
A2+							
A2-		● 支持24V推挽接口					
B2+	脉冲给定	● 支持24V集电极开路接口					
B2-	孙平纪廷	● 支持5V差分输入接口					
Z2+		● 频率响应400kHz					
Z2-							

信号名 端子功能描述 AO+ ● 支持集电极开路输出,输入端外接上位电阻 BO+ ● 支持1~255分频,通过P20.16或P24.16设置 ● 支持分频输出源选择,通过P20.17或P24.17设置

表 2-6 EC-PG507-12 端子定义

PE	A1+	B1+	Z1+	PWR
PGND	A1-	B1-	Z1-	PGND

表 2-7 EC-PG507-12 端子功能定义

信号名	端口说明	端子功能描述
PE	接地端子	连接大地,增强抗干扰性能
PWR	400000000	电压5V/12V±5%,最大输出150mA,通过跳线帽CN9
PGND	编码器电源	选择电压等级,根据所使用编码器的电压等级进行选择
A1+		
A1-		● 支持5V/12V推挽接口
B1+	编码器输入	● 支持5V/12V集电极开路接口
B1-	細均器制入	● 支持5V差分接口,支持差分接法断线检测功能
Z1+		● 频率响应400kHz
71-		

表 2-8 EC-PG507-24 端子定义

PE	A1+	B1+	Z1+	PWR				
PGND	A1-	B1-	Z1-	PGND				

表 2-9 EC-PG507-24 端子功能定义

信号名	端口说明	端子功能描述				
PE	接地端子	连接大地,增强抗干扰性能				
PWR	编码器电源	中压247/1-50/ 是十龄山中流150m4				
PGND	細呁器电源	电压24V±5%,最大输出电流150mA				
A1+						
A1-	编码器输入	● 支持24V推挽接口				
B1+		● 支持24V集电极开路接口				
B1-		● 支持24V差分接口,支持差分接法断线检测功能				
Z1+		● 频率响应400kHz				
Z1-						

2.6 接线注意事项

集电极开路接法、推挽接法建议长线距离在 50m 以内,差分接法建议长线距离在 100m 以内,编 码器反馈线与电机线必须相隔 20cm 以上走线,编码器反馈线屏蔽层在变频器侧与 PE 相连接,线 缆线径满足 1.25mm2(AWG18)以上。

PG 卡内部配有上拉电阻,通过不同的外部接线方式可与多种增量式编码器配套使用,具体接线方 式如图 2-3 和图 2-4 所示。

表 2-10 不同接法跳线帽定义

端口说明 跳线帽接口		差分(默认)或推挽或集	集电极开路接法		
编码器输入	CN6、CN7、CN8	电极开路接法 短接 DIFF	短接 OC		
脉冲给定	CN5	短接 DIFF	短接 OC		

图 2-3 与差分型编码器配套使用时的外部接线

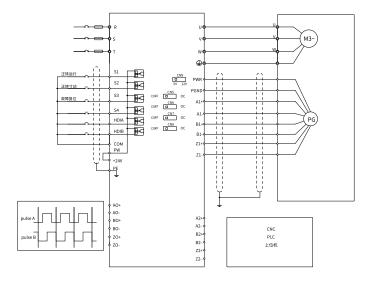
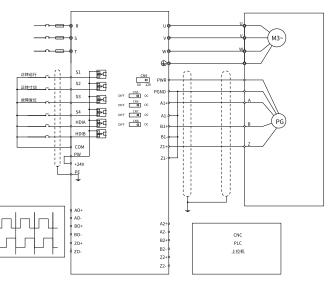


图 2-4 与推挽或集电极开路型编码器配套使用时的外部接线



产品资料可能有所改动,恕不另行通知。版权所有,仿冒必究。

202509 (V1.0)

Signal

name

A1+

A1-

BO-

ZO+

ZO-

BO+ Frequency-division

output

Incremental PG Expansion Card Quick Start Guide

This guide briefly introduces the product information, Scan the QR code to view installation and wiring of the incremental PG expansion the full electronic manual.

Visit www.invt.com for more information and source download. For details, see the full version of corresponding product e-manual.



Preface

Thank you for choosing INVT incremental PG expansion card.

The incremental PG expansion card is a series of PG cards designed for multiple general-purpose VFDs and must be used together with VFDs such as the GD350 series. It connects to encoders through incremental signals, and offers four finished cards: EC-PG505-12, EC-PG505-24B, EC-PG507-12, and EC-PG507-24.

- Supports encoder power supply.
- Supports multifunction series, including encoder input, pulse reference input, and frequency-division output (available only on EC-PG505-12 and EC-PG505-24B models).
- Supports simplified function series, including encoder input (available only on EC-PG507-12 and EC-PG507-24 models)
- Supports differential, open collector (OC), and push-pull wiring methods.
- Supports hardware disconnection detection for encoder differential input; when used with the control board, it supports switching from closed-loop to open-loop control.
- Supports series or parallel connection for frequency-division output.
- The PE terminal of each card must be reliably grounded.

1 Product overview

1.1 Model description

Figure 1-1 Product nameplate and model

	EC-P	<u>G</u> <u>50</u>					
model			Working power supply				
			12: 5V or 12V				
			24: 24V				
			Distinguishing code				
			5: GD350				
			05: Incremental multifunction				
			07: Incremental simplified function				
		Module	category				
		PG: Encoder card					
	Produc	Product category					
	EC: Ex	pansion	card				

1.2 Specifications

Table 1-1 Specifications

	·
Item	Specifications
Working temperature	-10-50°C
Storage temperature	-20-60°C
Relative humidity	5%–95% (No condensation)
Operating environment	No corrosive gas
Installation method	Secured in the slot with screws
Ingress protection (IP) rating	IP00
Cooling method	Natural air cooling

1.3 Product structure

The finished card consists of a finished board without an enclosure structure.

1.4 Indicators

Table 1-2 Indicator functions

		Table 1-2 indicator functions
Indicator	Definition	Function
LED1	Signal indicator	Blinking (On: 500ms; Off: 500ms): A1 or B1 signal is disconnected during encoder rotating. On: Other cases
PWR	Power indicator	On: The expansion card is powered on. Off: The expansion card is not powered on.
ST	Status indicator	On: The expansion card is connecting with the control board. Blinking (On: 500ms; Off: 500ms): The expansion card is properly connected to the control board. Off: The expansion card is disconnected from the control board.
BR	Disconnecti on indicator	On: The encoder input differential signal is disconnected. Off: The encoder input differential signal is not disconnected.

1.5 Function selection

Table 1-3 Function selection

Finished card model	Name	Function
EC-PG505-12	Multifunction incremental PG card 5V/12V	Encoder input + pulse reference + frequency-division output
EC-PG505-24B	Multifunction incremental PG card 24V	Encoder input + pulse reference + frequency-division output
EC-PG507-12	Simplified incremental PG card 5V/12V	Encoder input
EC-PG507-24	Simplified incremental PG card 24V	Encoder input

1.6 Expansion card parameters

Table 1-4 Expansion card parameters

Model	Function	Specifications
	Power supply	Voltage: 5V/12V ±5% Max. output: 150mA Selects the voltage class through the jumper CN9
		based on the voltage class of the used encoder.
		 Applicable to 5V/12V push-pull encoders Applicable to 5V/12V OC encoders
	Encoder input	Applicable to 5V differential encoders with differential signal disconnection detection function
EC-PG505-12		Response frequency: 400kHz
20 / 0000 12		Applicable to 5V/12V push-pull encoders
	Pulse reference	Applicable to 5V/12V OC encoders
		Applicable to 5V differential encoders
		 Response frequency: 400kHz Differential output of 5V
	Frequency-division output	 Supports frequency division of 1255, which can be set through P20.16 or P24.16 Supports frequency-division output source selection, which can be set through P20.17 or P24.17
	D	Voltage: 24V ± 5%
	Power supply	Max. output current: 150mA
EC-PG505-24B	Encoder input	Applicable to 24V push-pull encoders Applicable to 24V OC encoders Applicable to 24V differential encoders with differential signal disconnection detection function
	Pulse reference	Response frequency: 400kHz Applicable to 24V push-pull encoders Applicable to 24V OC encoders Applicable to 5V differential encoders Response frequency: 400kHz
	Frequency-division output	 Supports OC output with a pull-up resistor externally connected to the input port Supports frequency division of 1255, which can be set through P20.16 or P24.16 Supports frequency-division output source selection, which can be set through P20.17 or P24.17
		Voltage: 5V/12V \pm 5%
	Power supply	Max. output: 150mA Selects the voltage class through the jumper CN9 based on the voltage class of the used encoder.
EC-PG507-12	Encoder input	Applicable to 5V/12V push-pull encoders Applicable to 5V/12V OC encoders Applicable to 5V differential encoders with differential signal disconnection detection function Response frequency: 400kHz
	Pulse reference	Unavailable
	Frequency-division output	Unavailable
	Power supply	Voltage: 24V ± 5% Max. output current: 150mA
EC-PG507-24	Encoder input	 Applicable to 24V push-pull encoders Applicable to 24V OC encoders Applicable to 24V differential encoders with differential signal disconnection detection function Response frequency: 400kHz
	Pulse reference	Unavailable
	Frequency-division output	Unavailable

2 Installation and wiring

2.1 Installation precautions



Ensure the VFD is powered off before installation.

Note: According to the expansion card installation slot position specifications, for VFDs with three card slots, it is recommended to install the expansion card in SLOT2; for VFDs with only two slots, it is recommended to install the expansion card in SLOT1.

Required tools: Phillips screwdriver PH1, straight screwdriver SL3

Table 2-1 Screw torque requirements

Screw size Fastening torque	
M3 0.55 N•m	

2.2 Product dimensions

The dimensions of the expansion card are 108.5x39mm, as shown in Figure 2-1.

Figure 2-1 Dimension drawing



2.3 Installation instructions

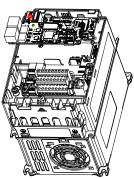
The following shows an example of the installation in slot 3 (see figure b).

Step 1 Position the communication card in the designated area of slot 3 on the control board, ensuring proper alignment with the slot before securely fastening it together.

Step 2 Guide the communication card into place using the positioning stud.

Step 3 Secure it in position with M3 screws, completing the installation.

Figure 2-2 Installation position diagram





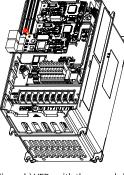


Figure a) VFDs with two card slots

Figure b) VFDs with three card slots

Note:

- The expansion card and control board are electrically connected through slots. Please install them in place
- To ensure the reliable operation of the expansion card and EMC requirements are met, please tighten the screws according to the recommended torque for reliable grounding.

2.4 Disassembly instructions

You can disassembly the product by reversing the order of steps described in section $2.3\,$ Installation instructions.

Step 1 Disconnect the power supply and disassemble all cables connected to the expansion card

Step 2 Use a Phillips screwdriver to remove the grounding screw of the expansion card. Step 3 Pull the expansion card out to a suitable position.

2.5 User's wiring terminals

Table 2-2 EC-PG505-12 terminals

	PE	AO+	BO+	ZO+	A1+	B1+	Z1+	A2+	B2+	Z2+	PWR
	GND	AO-	BO-	ZO-	A1-	B1-	Z1-	A2-	B2-	Z2-	PGND
Į	GIVD	Α0-	DO-	20-	VI-	D1-	Z1-	72-	DZ-		1 GIVD

Table 2-3 EC-PG505-12 terminal function definition

Signal name	Port description	Function description
PE		Connected to the ground to enhance the anti-interference performance
PWR		● Voltage: 5V/12V ± 5%
PGND		Max. output: 150mA
GND	Encoder power	Selects the voltage class through the jumper CN9 based on the voltage class of the used encoder. GND serves as the signal ground (functionally equivalent to AGND). The encoder input and pulse

Port description **Function description** command signals use PGND as the reference ground, while the frequency-division output is provided as differential signals. • Applicable to 5V/12V push-pull encoders Applicable to 5V/12V OC encoders

B1+	Faredon's act	• Applicable to 51/121 de cheders
B1-	Encoder input	Applicable to 5V differential encoders with differential signal disconnection detection function
Z1+		Response frequency: 400kHz
Z1-		Response frequency. 400KHz
A2+		
A2-		 Applicable to 5V/12V push-pull encoders
B2+	Pulse setting	 Applicable to 5V/12V OC encoders
B2-	ruise setting	 Applicable to 5V differential encoders
Z2+		Response frequency: 400kHz
Z2-		
AO+		Differential output of EV
AO-		Differential output of 5V Supporting frequency division of 1255, which can be

Table 2-4 EC-PG505-24B terminals

F	PΕ	AO+	BO+	ZO+	A1+	B1+	Z1+	A2+	B2+	Z2+	PWR
G	ДĀ				A1-	B1-	Z1-	A2-	B2-	Z2-	PGND

set through P20.16 or P24.16

Supports frequency-division output source selection

which can be set through P20.17 or P24.17

Table 2-5 EC-PG505-24B terminal function definition

Signal name	Port description	Function description			
PE	Grounding terminal	Connected to the ground to enhance the anti-interference performance			
PWR		Voltage: 24V ± 5%			
PGND		Max. output current: 150mA			
GND	Encoder power	 GND serves as the signal ground. The encoder input and pulse command signals use PGND as the reference ground, while the frequency-division output uses GND as the reference ground. 			
A1+		A sufficient to 24V such sull such days			
A1-		Applicable to 24V push-pull encoders			
B1+	Encoder input	Applicable to 24V OC encoders Applicable to 24V differential appendix with			
B1-		Applicable to 24V differential encoders with differential signal disconnection detection function			
Z1+		Response frequency: 400kHz			
Z1-		Response frequency. 400km2			
A2+					
A2-	Pulse setting	Applicable to 24V push-pull encoders			
B2+		Applicable to 24V OC encoders			
B2-		Applicable to 5V differential encoders			
Z2+		Response frequency: 400kHz			
Z2-					
AO+		• Supports OC output with a pull-up resistor externally			
BO+		connected to the input port			
ZO+	Frequency-division output	 Supporting frequency division of 1255, which can be set through P20.16 or P24.16 Supports frequency-division output source selection, which can be set through P20.17 or P24.17 			

Table 2-6 EC-PG507-12 terminals

PE	A1+	B1+	Z1+	PWR
PGND	A1-	B1-	Z1-	PGND

Table 2-7 EC-PG507-12 terminal function definition

Signal name	Port description	Function description	
PE	Grounding	Connected to the ground to enhance the	
FE	terminal	anti-interference performance	
PWR	Encoder nower	Voltage: 5V/12V±5%	
PGND		Max. output: 150Ma	
		Selects the voltage class through the jumper CNS	
		based on the voltage class of the used encoder.	
A1+	Encoder input	 Applicable to 5V/12V push-pull encoders 	
A1-		 Applicable to 5V/12V OC encoders 	
B1+		 Applicable to 5V differential encoders with 	
B1-		differential signal disconnection detection	
Z1+		function	
Z1-		Response frequency: 400kHz	

Table 2-8 EC-PG507-24 terminal definition

PE	A1+	B1+	Z1+	PWR
PGND	A1-	B1-	Z1-	PGND

Table 2-9 EC-PG507-24 terminal function definition

Signal name	Port description	Description	
PE	Grounding	Connected to the ground to enhance the	
PC	terminal	anti-interference performance	
PWR Voltage: 24V		Voltage: 24V ± 5%	
PGND	Encoder power	Max. output current: 150mA	
A1+		Applicable to 24V push-pull encoders	
A1- B1+ B1- Z1+		 Applicable to 24V OC encoders 	
	Encoder input	Applicable to 24V differential encoders with	
		differential signal disconnection detection	
		function	
Z1-		Response frequency: 400kHz	

2.6 Wiring precautions

For OC and push-pull wiring methods, the recommended maximum cable length is 50m. For differential wiring, the recommended maximum cable length is 100m. Encoder feedback cables must be routed at least 20cm away from motor cables. The shielding layer of the encoder feedback cable must be connected to the PE terminal on the VFD side. Cable cross-sectional area must be no less than 1.25mm² (AWG18).

The PG expansion card is configured with a pull-up resistor and can work in combination

with multiple types of incremental encoders through various external wiring modes. For the wiring methods, see Figure 2-3 and Figure 2-4.

Table 2-10 Jumper definitions for different wiring methods

Port description	Jumper interface	Differential (default) or push-pull or OC wiring	OC wiring
Encoder input	CN6, CN7, CN8	Short DIFF	Short OC
Pulse reference	CN5	Short DIFF	Short OC

Figure 2-3 External wiring diagram when used with a differential encoder

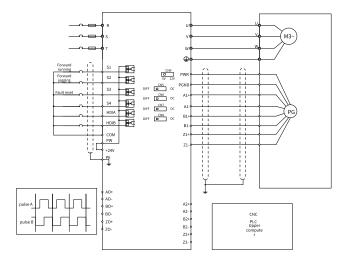
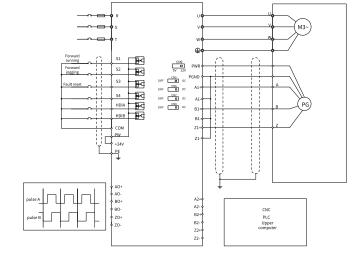


Figure 2-4 External wiring diagram when used with a push-pull or an OC encoder





Manual information may be subject to change without prior notice.

202509 (V1.0)