Goodrive290 系列低压多功能通用变频器快速使用指南

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#### Goodrive290 系列低压多功能通用变频器快速使用指南

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# 快速使用指南

本指南简要介绍了 Goodrive290 系列低压多功能通用变频器 扫描二维码,查阅产品完整 的外围接线、端子、键盘、快速运行、常用功能参数设置、常 版电子说明书。 见故障及对策。 拨打服务热线 400-700-9997 或访问 www.invt.com.cn 获取 更多信息及资源下载。保修条款详见完整版电子说明书。



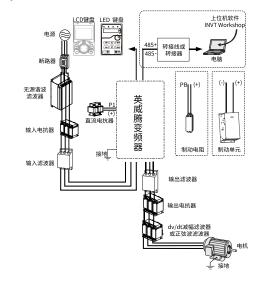
本指南仅包含基本的安装调试信息。若不遵守相关文档中的安全说明和安装调试说明,可能导 致设备损坏、人身伤害、甚至人员死亡等事故。 只有培训合格的专业人员才允许进行相关操作。

🔨 警告

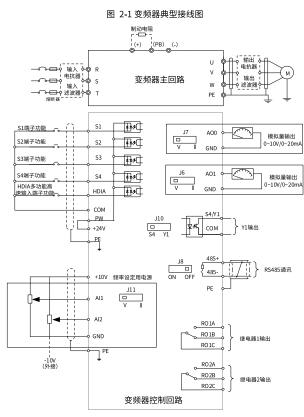
禁止在电源接通	的情况下进行接线、检查或更换器件等作业。进行这些作业前,须确认所有
入电源已断开,	并等待不短于变频器上标注的时间或者确认直流母线电压低于 36V。
至少等待时间	变频器机型
5 分钟	3PH 380V 0.75~110kW
15 分钟	3PH 380V 132~315kW

#### 1 外围接线

20 分钟 3PH 380V 355kW 以上



## 2 端子

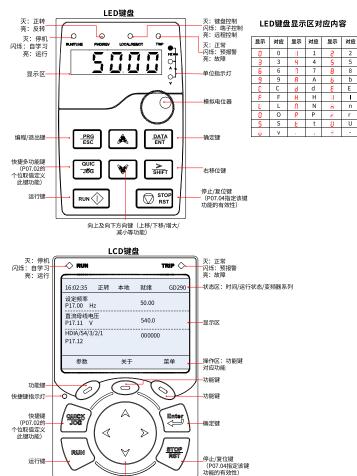


端子	子							
主回路站								
R, S, T	三相交流输入端子,与电网连接							
U, V, W 三相交流输出端子,一般接电机								
(+)         (-)         外接制动单元端子/共直流母线端子           PB         PB、(+)外接制动电阻端子								
$\bigoplus$	PE 端子,每台机器 PE 端子必须可靠接地							
控制回路	8端子							
+10V	本机提供 10V 电源							
AI1	模拟量输入;默认为电压输入,通过跳线帽设置为电流输入;输入范围: 0~10V/0~20mA							
AI2	模拟量输入;输入范围: -10~10V							
GND	+10V 的参考地							
AO0	模拟量输出;默认为电压输出,通过跳线帽设置为电流输出;输出范围:							
AO1	0~10V/0~20mA							
RO1A	继电器输出;RO1A 常开,RO1B 常闭,RO1C 公共端							
RO1B	继电器输出;RO2A 常开,RO2B 常闭,RO2C 公共端							
RO1C	触点容量: 3A/AC 250V,1A/DC 30V							
СОМ	+24V 的参考地							
485+	485 差分信号通讯端口,标准 485 通讯接口请使用屏蔽双绞线,485 通讯的 120Ω 终							
485-	端匹配电阻通过拨码开关或跳线选择接入							
PE	接地端子							
PW	开关量的外部电源输入端子。NPN 模式下,将 PW 与+24V 短接;PNP 模式下,将 PW 与 COM 短接							
+24V	变频器提供用户电源,最大输出电流 200mA							
S1~S4	开关量输入;最大输入频率:1kHz;内部阻抗:3.3kΩ Y1 端子开路输出,与 S4 共用端子,通过跳线帽选择功能							
HDIA	除具有开关量输入功能外,还可作为高频脉冲输入通道;最大输入频率:50kHz							

表 2-1 变频器端子说明

# 3 键盘

GD290 系列产品标配 LED 键盘,支持选配 LCD 键盘。



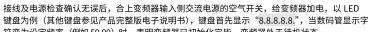
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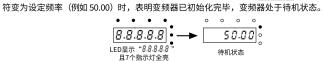
方向键(增大/减小/进入/返回等功能)

# 4 快速运行

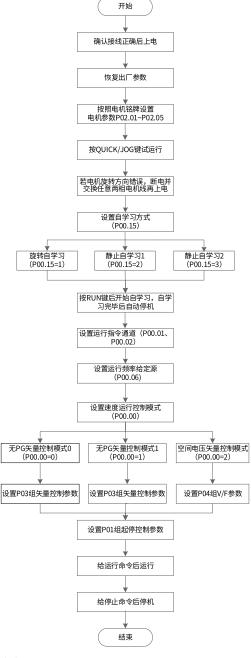
# 4.1 上电前检查

	•	请确认所有的端子已正确紧固连接。
4	•	请确认电机与变频器功率匹配。





快速运行操作如下图所示:



#### 5 常用功能参数设置

下述功能参数表仅列出部分常见功能参数,并进行了简要描述、列举典型取值。

- "〇":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。

变频器已对各参数的修改属性作了自动检查约束,可帮助用户避免误修改。

功能码	名称	说明	缺省值	更改
		0: 无PG矢量控制模式0		
P00.00	速度控制模式	1: 无PG矢量控制模式1	机型确定	$\odot$
		2: 空间电压矢量控制模式		
		0:键盘运行指令通道		
P00.01	运行指令通道	1:端子运行指令通道	0	0
		2:通讯运行指令通道		
P00.03	最大输出频率	P00.04~400.00Hz	50.00Hz	$\odot$
P00.04	运行频率上限	P00.05~P00.03(最大输出频率)	50.00Hz	0
P00.05	运行频率下限	0.00Hz~P00.04(运行频率上限)	0.00Hz	$\bigcirc$
P00.06	A频率指令选择	0:键盘数字设定	0	0
P00.07	B频率指令选择	1: 模拟量Al1设定	2	0

-1-

	名称	说明	缺省值	更
		2: 模拟量AI2设定		
		3: 模拟量AI3设定		
		4:高速脉冲HDIA设定		
		5:简易PLC程序设定		
		6:多段速运行设定		
		7: PID控制设定		
		8:Modbus/Modbus TCP通讯设定		
		9: Profibus/CANopen通讯设定		
		10: 以太网通讯设定		
		11~12:保留		
		13: EtherCAT/Profinet/Ethernet IP通讯设		
		定		
		~_ 14: PLC可编程卡设定		
		15~17: 保留		
		18:键盘模拟量设定(仅适用于0R7G/1R5P~		
		018G/022P)		
		<u> </u>		
D00 10	なまたいこのような	机型无效。	F0 0011-	
P00.10	键盘设定频率	0.00Hz~P00.03(最大输出频率)	50.00Hz	C
P00.11	加速时间1	0.0~3600.0s	机型确定	C
P00.12	减速时间1		机型确定	С
		0:默认方向运行	_	
P00.13	运行方向选择	1:相反方向运行	0	С
		2:禁止反转运行		
		0:无操作		
D00 17	中有多些生活一	1: 旋转自学习	_	
P00.15	电机参数自学习	2:静止自学习1	0	C
		3:静止自学习2		
				-
		0:无操作		
P00.18	功能参数恢复	1: 恢复缺省值	0	C
		2: 清除故障档案		
		3:功能码锁定(锁定所有功能码)		
		0: 直接起动		
P01.00	起动运行方式	1: 先直流制动再起动	0	C
	04 L ( L )	2:转速追踪再起动	Ĩ	
				-
P01.08	停机方式选择	0: 减速停车	0	С
		1: 自由停车		
P01.09	停机制动开始频率	0.00Hz~P00.03(最大输出频率)	0.00Hz	С
P01.11	停机直流制动电流	0.0~100.0%	0.00%	С
P01.12		0.00~50.00s	0.00s	Ċ
		0: 上电时端子运行命令无效		
P01.18	选择	1: 上电时端子运行命令有效	0	C
D02.01			ᆔᅖᄻᅌ	C
P02.01	异步电机1额定功率		机型确定	)
P02.02		0.01Hz~P00.03(最大输出频率)	50.00Hz	C
P02.03	异步电机1额定转速	1~60000rpm	机型确定	C
D02.04	异步电机1额定电压	0~12001/	机型确定	C
P02.04		0 12000		
	日止中却。薛白中法	0.0.0000.01	机型确定	C
P02.05	异步电机1额定电流	0.8~6000.0A	机型确定 20.0	
P02.05 P03.00	异步电机1额定电流 速度环比例增益1	0.8~6000.0A 0.0~200.0	20.0	С
P02.05 P03.00 P03.01	异步电机1额定电流 速度环比例增益1 速度环积分时间1	0.8~6000.0A 0.0~200.0 0.000~10.000s	20.0 0.200s	C
P02.05 P03.00 P03.01 P03.03	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0	20.0 0.200s 20.0	C
P02.05 P03.00 P03.01	异步电机1额定电流 速度环比例增益1 速度环积分时间1	0.8~6000.0A 0.0~200.0 0.000~10.000s	20.0 0.200s	C
P02.05 P03.00 P03.01 P03.03	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0	20.0 0.200s 20.0	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12)	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12) 1: 键盘设定转矩(P03.12)	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12) 1: 键盘设定转矩(P03.12) 2: 模拟量Al1设定转矩	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量AI1设定转矩 3:模拟量AI2设定转矩	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000-10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量Al1设定转矩 3:模拟量Al2设定转矩 4:模拟量Al3设定转矩	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量AI1设定转矩 3:模拟量AI2设定转矩	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000-10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量Al1设定转矩 3:模拟量Al2设定转矩 4:模拟量Al3设定转矩	20.0 0.200s 20.0 0.200s	
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P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量Al2设定转矩 3:模拟量Al2设定转矩 4:模拟量Al3设定转矩 5:脉冲频率HDIA设定转矩 5:脉冲频率HDIA设定转矩 6:多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环比例增益2 速度环积分时间2	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12) 1: 键盘设定转矩(P03.12) 2: 模拟量Al1设定转矩 3: 模拟量Al2设定转矩 4: 模拟量Al2设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩	20.0 0.200s 20.0 0.200s	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量Al1设定转矩 3:模拟量Al2设定转矩 4:模拟量Al2设定转矩 5:脉冲频率HDIA设定转矩 6:多段转矩设定 7:Modbus/ModbusTCP通讯设定转矩 8:Profibus/CANopen通讯设定转矩 9:以太网通讯设定转矩	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量Al1设定转矩 3:模拟量Al2设定转矩 4:模拟量Al3设定转矩 5:脉冲频率HDIA设定转矩 6:多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9:以太网通讯设定转矩 10:保留	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0:键盘设定转矩(P03.12) 1:键盘设定转矩(P03.12) 2:模拟量Al1设定转矩 3:模拟量Al2设定转矩 4:模拟量Al3设定转矩 5:脉冲频率HDIA设定转矩 6:多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9:以太网通讯设定转矩 10:保留 11: EtherCAT/Profinet/Ethernet IP通讯设	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000-10.000s 0~65535 0: 键盘设定转矩 (P03.12) 1: 键盘设定转矩 (P03.12) 2: 模拟量Al1设定转矩 3: 模拟量Al2设定转矩 4: 模拟量Al3设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩 (P03.12) 1: 键盘设定转矩 (P03.12) 2: 模拟量Al1设定转矩 3: 模拟量Al2设定转矩 4: 模拟量Al3设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩 (P03.12) 1: 键盘设定转矩 (P03.12) 2: 模拟量A11设定转矩 3: 模拟量A12设定转矩 4: 模拟量A13设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩 (P03.12) 1: 键盘设定转矩 (P03.12) 2: 模拟量Al1设定转矩 3: 模拟量Al2设定转矩 4: 模拟量Al3设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩 (P03.12) 1: 键盘设定转矩 (P03.12) 2: 模拟量A11设定转矩 3: 模拟量A12设定转矩 4: 模拟量A13设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12) 1: 键盘设定转矩(P03.12) 2: 模拟量Al1设定转矩 3: 模拟量Al2设定转矩 4: 模拟量Al3设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留 18: 键盘模拟量设定(仅适用于0R7G/1R5P~	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.11	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环化例增益2 速度环积分时间2 电流环比例系数P 转矩设定方式选择	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12) 1: 键盘设定转矩(P03.12) 2: 模拟量Al2设定转矩 3: 模拟量Al2设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留 18: 键盘模拟量设定(仅适用于0R7G/1R5P~ 018G/022P) ✓ <b>注意:</b> 非零取值即为转矩模式。	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P 转矩设定方式选择 电机1转矩提升	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12) 1: 键盘设定转矩(P03.12) 2: 模拟量Al2设定转矩 3: 模拟量Al2设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留 18: 键盘模拟量设定(仅适用于0R7G/1R5P~ 018G/022P)	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.11	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 电流环比例系数P 转矩设定方式选择 电机1转矩提升 电机1V/F转差补偿	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩(P03.12) 1: 键盘设定转矩(P03.12) 2: 模拟量Al2设定转矩 3: 模拟量Al2设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留 18: 键盘模拟量设定(仅适用于0R7G/1R5P~ 018G/022P) ✓ <b>注意:</b> 非零取值即为转矩模式。	20.0 0.200s 20.0 0.200s 1000	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.11	异步电机1额定电流 速度环托例增益1 速度环积分时间1 速度环积分时间2 电流环比例系数P 转矩设定方式选择 转矩设定方式选择 电机1转矩提升 电机1V/F转差补偿 增益	<ul> <li>0.8~6000.0A</li> <li>0.0~200.0</li> <li>0.000~10.000s</li> <li>0.000~10.000s</li> <li>0.000~10.000s</li> <li>0~65535</li> <li>0: 键盘设定转矩(P03.12)</li> <li>1: 键盘设定转矩(P03.12)</li> <li>2: 模拟量Al3设定转矩</li> <li>3: 模拟量Al3设定转矩</li> <li>4: 模拟量Al3设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>6: 多段转矩设定</li> <li>7: Modbus/Modbus TCP通讯设定转矩</li> <li>9: 以太网通讯设定转矩</li> <li>10: 保留</li> <li>11: EtherCAT/Profinet/Ethernet IP通讯设定</li> <li>12: PLC可编程卡设定</li> <li>13~17: 保留</li> <li>18: 键盘模拟量设定(仅适用于0R7G/1R5P~</li> <li>018(022P)</li> <li>/注意: 非零取值即为转矩模式。</li> <li>0.0%: (自动转矩提升), 0.1%~10.0%</li> </ul>	20.0 0.200s 20.0 0.200s 1000 0 0	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.11	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 电流环比例系数P 转矩设定方式选择 电机1转矩提升 电机1V/F转差补偿	<ul> <li>0.8~6000.0A</li> <li>0.0~200.0</li> <li>0.000~10.000s</li> <li>0.000~10.000s</li> <li>0.000~10.000s</li> <li>0~65535</li> <li>0: 键盘设定转矩(P03.12)</li> <li>1: 键盘设定转矩(P03.12)</li> <li>2: 模拟量Al3设定转矩</li> <li>3: 模拟量Al3设定转矩</li> <li>4: 模拟量Al3设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>6: 多段转矩设定</li> <li>7: Modbus/Modbus TCP通讯设定转矩</li> <li>9: 以太网通讯设定转矩</li> <li>10: 保留</li> <li>11: EtherCAT/Profinet/Ethernet IP通讯设定</li> <li>12: PLC可编程卡设定</li> <li>13~17: 保留</li> <li>18: 键盘模拟量设定(仅适用于0R7G/1R5P~</li> <li>018(022P)</li> <li>/注意: 非零取值即为转矩模式。</li> <li>0.0%: (自动转矩提升), 0.1%~10.0%</li> </ul>	20.0 0.200s 20.0 0.200s 1000 0 0	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.01 P03.11 P03.11 P04.01 P04.09 P04.10	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 电流环比例系数P 转矩设定方式选择 转矩设定方式选择 电机1转矩提升 电机1 V/F转差补偿 增益 电机11高频抑制振荡 因子 电机1高频抑制振荡	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩 (P03.12) 1: 键盘设定转矩 (P03.12) 2: 模拟量Al2设定转矩 3: 模拟量Al2设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留 18: 键盘模拟量设定(仅适用于0R7G/1R5P~ 018G/022P) <b>注意:</b> 非零取值即为转矩模式。 0.0%: (自动转矩提升), 0.1%~10.0% 0.0~200.0%	20.0 0.200s 20.0 1000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.09 P03.11 P03.11 P04.01 P04.01 P04.09 P04.10	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P 转矩设定方式选择 转矩设定方式选择 电机1转矩提升 电机1 V/F转差补偿 增益 电机11高频抑制振荡 因子	<ul> <li>0.8~6000.0A</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~65535</li> <li>0: 键盘设定转矩 (P03.12)</li> <li>1: 键盘设定转矩 (P03.12)</li> <li>2: 模拟量Al1设定转矩</li> <li>3: 模拟量Al2设定转矩</li> <li>4: 模拟量Al3设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>6: 多段转矩设定</li> <li>7: Modbus/Modbus TCP通讯设定转矩</li> <li>9: 以太网通讯设定转矩</li> <li>10: 保留</li> <li>11: EtherCAT/Profinet/Ethernet IP通讯设定</li> <li>12: PLC可编程卡设定</li> <li>13~17: 保留</li> <li>18: 键盘模拟量设定(仅适用于0R7G/1R5P~</li> <li>018(/022P)</li> <li>注意: 非零取值即为转矩模式。</li> <li>0.0%: (自动转矩提升), 0.1%~10.0%</li> <li>0~100</li> <li>0~100</li> </ul>	20.0 0.200s 20.0 1000 0 0 0	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.01 P03.11 P03.11 P04.01 P04.09 P04.10	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P 转矩设定方式选择 转矩设定方式选择 电机1转矩提升 电机1 V/F转差补偿 增益 电机11高频抑制振荡 因子 电机1高频抑制振荡	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000~10.000s 0~65535 0: 键盘设定转矩 (P03.12) 1: 键盘设定转矩 (P03.12) 2: 模拟量Al2设定转矩 3: 模拟量Al2设定转矩 5: 脉冲频率HDIA设定转矩 5: 脉冲频率HDIA设定转矩 6: 多段转矩设定 7: Modbus/Modbus TCP通讯设定转矩 8: Profibus/CANopen通讯设定转矩 9: 以太网通讯设定转矩 10: 保留 11: EtherCAT/Profinet/Ethernet IP通讯设 定 12: PLC可编程卡设定 13~17: 保留 18: 键盘模拟量设定(仅适用于0R7G/1R5P~ 018G/022P) <b>注意:</b> 非零取值即为转矩模式。 0.0%: (自动转矩提升), 0.1%~10.0% 0.0~200.0%	20.0 0.200s 20.0 1000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.09 P03.11 P03.11 P04.01 P04.01 P04.10 P04.11 P05.01	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P 转矩设定方式选择 电机1转矩提升 电机1 V/F转差补偿 增益 电机11高频抑制振荡 因子 51端子功能选择	<ul> <li>0.8~6000.0A</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~65535</li> <li>0: 键盘设定转矩 (P03.12)</li> <li>1: 键盘设定转矩 (P03.12)</li> <li>2: 模拟量Al1设定转矩</li> <li>3: 模拟量Al2设定转矩</li> <li>4: 模拟量Al3设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>6: 多段转矩设定</li> <li>7: Modbus/Modbus TCP通讯设定转矩</li> <li>9: 以太网通讯设定转矩</li> <li>10: 保留</li> <li>11: EtherCAT/Profinet/Ethernet IP通讯设定</li> <li>12: PLC可编程卡设定</li> <li>13~17: 保留</li> <li>18: 键盘模拟量设定(仅适用于0R7G/1R5P~</li> <li>018(/022P)</li> <li>注意: 非零取值即为转矩模式。</li> <li>0.0%: (自动转矩提升), 0.1%~10.0%</li> <li>0~100</li> <li>0~100</li> </ul>	20.0 0.200s 20.0 1000 0 0 0 0 0 0 0 0 0 0 0 0	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.01 P03.11 P03.11 P04.01 P04.01 P04.01 P04.11 P05.01 P05.02	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P 电流环比例系数P 转矩设定方式选择 电机1转矩提升 电机11高频抑制振荡 因子 电机1高频抑制振荡 因子 51端子功能选择 S2端子功能选择	<ul> <li>0.8~6000.0A</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~65535</li> <li>0: 键盘设定转矩(P03.12)</li> <li>1: 键盘设定转矩(P03.12)</li> <li>2: 模拟量Al2设定转矩</li> <li>3: 模拟量Al2设定转矩</li> <li>3: 模拟量Al2设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>4: 模拟量Al3设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>6: 多段转矩设定</li> <li>7: Modbus/Modbus TCP通讯设定转矩</li> <li>8: Profibus/CANopen通讯设定转矩</li> <li>10: 保留</li> <li>11: EtherCAT/Profinet/Ethernet IP通讯设定</li> <li>12: PLC可编程卡设定</li> <li>13~17: 保留</li> <li>18: 键盘模拟量设定(仅适用于0R7G/1R5P~</li> <li>018G/022P)</li> <li>/注意: 非零取值即为转矩模式。</li> <li>0.0%: (自动转矩提升), 0.1%~10.0%</li> <li>0.~200.0%</li> <li>0~100</li> <li>0~100</li> <li>0. 无功能</li> <li>1: 正转运行(FWD)</li> </ul>	20.0 0.200s 20.0 0.200s 1000 0 0 0 0 0 0 0 0 0 100.0% 100 10 10 1 4	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.09 P03.11 P03.11 P04.01 P04.01 P04.10 P04.11 P05.01	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P 转矩设定方式选择 电机1转矩提升 电机1 V/F转差补偿 增益 电机11高频抑制振荡 因子 51端子功能选择	0.8~6000.0A 0.0~200.0 0.000~10.000s 0.0~200.0 0.000-10.000s 0~65535 0. 键盘设定转矩 (P03.12) 1. 键盘设定转矩 (P03.12) 2. 模拟量Al1设定转矩 3. 模拟量Al2设定转矩 4. 模拟量Al3设定转矩 5. 脉冲频率HDIA设定转矩 5. 脉冲频率HDIA设定转矩 6. 多段转矩设定 7. Modbus/Modbus TCP通讯设定转矩 8. Profibus/CANopen通讯设定转矩 9. 以太网通讯设定转矩 10. 保留 11. EtherCAT/Profinet/Ethernet IP通讯设 定 12. PLC可编程卡设定 13~17: 保留 18. 键盘模拟量设定(仅适用于0R7G/1R5P~ 0186/022P) /注意: 非零取值即为转矩模式。 0.0%: (自动转矩提升), 0.1%~10.0% 0.0~200.0% 0~100 0~100 0: 无功能 1: 正转运行 (FWD) 2: 反转运行 (REV)	20.0 0.200s 20.0 1000 0 0 0 0 0 0 0 0 0 0 0 0	
P02.05 P03.00 P03.01 P03.03 P03.04 P03.09 P03.01 P03.11 P03.11 P04.01 P04.01 P04.01 P04.11 P05.01 P05.02	异步电机1额定电流 速度环比例增益1 速度环积分时间1 速度环积分时间2 速度环积分时间2 电流环比例系数P 电流环比例系数P 转矩设定方式选择 转矩设定方式选择 电机1转矩提升 电机1V/F转差补偿 增益 电机11高频抑制振荡 因子 电机11高频抑制振荡 因子 毛11篇子功能选择 52端子功能选择	<ul> <li>0.8~6000.0A</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~200.0</li> <li>0.000~10.000s</li> <li>0.~65535</li> <li>0: 键盘设定转矩(P03.12)</li> <li>1: 键盘设定转矩(P03.12)</li> <li>2: 模拟量Al2设定转矩</li> <li>3: 模拟量Al2设定转矩</li> <li>3: 模拟量Al2设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>4: 模拟量Al3设定转矩</li> <li>5: 脉冲频率HDIA设定转矩</li> <li>6: 多段转矩设定</li> <li>7: Modbus/Modbus TCP通讯设定转矩</li> <li>8: Profibus/CANopen通讯设定转矩</li> <li>10: 保留</li> <li>11: EtherCAT/Profinet/Ethernet IP通讯设定</li> <li>12: PLC可编程卡设定</li> <li>13~17: 保留</li> <li>18: 键盘模拟量设定(仅适用于0R7G/1R5P~</li> <li>018G/022P)</li> <li>/注意: 非零取值即为转矩模式。</li> <li>0.0%: (自动转矩提升), 0.1%~10.0%</li> <li>0.~200.0%</li> <li>0~100</li> <li>0~100</li> <li>0. 无功能</li> <li>1: 正转运行(FWD)</li> </ul>	20.0 0.200s 20.0 0.200s 1000 0 0 0 0 0 0 0 0 0 100.0% 100 10 10 1 4	

invt	深圳市英质腾电气股份有限公司 SHENZHEN INVT ELECTRIC CO., LTD.
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Goodrive290 系列低压多功能通用变频器快速使用指南

功能码	名称	说明	缺省值	更改	
		6: 自由停车 7: 故障复位			
		9:外部故障输入			
		10:频率设定递增(UP)			
		11: 频率设定递减(DOWN)			
P05.37	AI2下限值	0.00V~P05.39	0.00V	C	
P05.39	AI2上限值	P05.37~10.00V	10.00V	C	
P06.01	Y1输出选择	0: 无效	0	C	
P06.03		1: 运行中	1	C	
P06.04	继电器RO输出选择	2: 正转运行中 3: 反转运行中 4: 点动运行中 5: 变频器故障 6: 频率水平检测FDT1 8: 频率到达	5	C	
P06.14~	4.0塔地県た山)とな	0:运行频率	0		
P06.15	AO模拟量输出选择	1: 设定频率	0	0	
P06.16	HDO高速脉冲输出 选择	<ol> <li>运行转速(相对于2倍电机同步转速)</li> <li>输出电流(相对于2倍变频器额定电流)</li> <li>输出电流(相对于2倍电机额定电流)</li> <li>输出电压(相对于1.5倍变频器额定电压)</li> <li>输出功率(相对于2倍电机额定功率)</li> </ol>	0	C	
P06.17~ P06.26	AO输出上下限设置	详情请参见完整版电子说明书。	-	C	
P07.00	用户密码	0~65535	0	C	
P14.00	本机通讯地址	1~247 《注意:从机地址不可为0。	1	C	
P14.01	通讯波特率设置	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps	4	C	
P14.02	数据位校验设置	0: 无校验(N, 8, 1)for RTU 1: 偶校验(E, 8, 1)for RTU 2: 奇校验(O, 8, 1)for RTU 3: 无校验(N, 8, 2)for RTU 4: 偶校验(E, 8, 2)for RTU 5: 奇校验(O, 8, 2)for RTU	1	C	

#### 6 常见故障及对策

1	故障码	故障类型	可能的原因	纠正措施			
	<b>以</b> )早19						
	OUt1		加减速太快;	增大加减速时间;			
		保护	该相 IGBT 内部损坏;	更换逆变单元;			
	OUt2	逆变单元 V 相	干扰引起误动作;	检查设备和系统是否可靠接地;			
		保护	驱动线连接不良;	请检查驱动线是否松动;			
		逆变单元 W 相	是否对地短路;	检查电机线缆和电机对地是否有短			
	OUt3	保护	机器使用环境差导致内部出现	路;			
		****	火花。	定期清理变频器内部粉尘或油污。			
	OC1	加速过电流		增大加减速时间;			
	OC2	减速过电流	加减速太快;	调高电网输入电压;			
			电网电压偏低;	选择功率更大的变频器;			
			变频器功率偏小;	检查电机是否堵转或短路,是否负载			
			负载突变或者异常;	设备存在异常;			
	OC3 OV1	恒速过电流	三相输出电流不平衡;	检查变频器三相输出电压是否正常和			
			外部存在强干扰源(系统有接	电机三相阻抗是否平衡;			
			触器切换、系统接地不良)。	检查是否存在强干扰现象(电机线远			
				离接触器、系统可靠接地)。			
		加速过电压	加减速时间过短;	增大加减速时间;			
	OV2	减速过电压	输入电压异常;	检查输入电压;			
		恒速过电压	存在电机旋转中启动的现象;	采用转速跟踪启动;			
	OV3		负载存在较大能量回馈;	需增加能耗制动组件或能量回馈单			
			能耗制动功能未打开。	元;			
				设置能耗制动功能参数。			
			电网电压偏低;	调高电网输入电压;			
	UV	母线欠压故障	母线电压显示异常;	联系厂家;			
			缓冲接触器吸合异常。	联系厂家。			
			电网电压过低;	调高电网输入电压;			
	OL1	电机过载	电机额定电流设置不正确;	重新设置电机参数组的电机额定电			
	-		电机堵转或负载突变过大。				
				检查负载,调节转矩提升量。			
				增大加速时间;			
			对旋转中的电机实施再启动;	避免停机再启动或进行转速跟踪启			
	OL2	变频器过载	电网电压过低;	动;			
			负载过大;	调高电网输入电压;			
			变频器功率选型偏小。	选择功率更大的变频器。			
			输入 R、S、T 缺相或波动	检查输入电源是否正常和输入线缆是			
	SPI	输入侧缺相	大;	否有松动;			
			输入侧螺丝松动。	可选择设置参数屏蔽。			
			输出线缆有破损或对地短路;	检查输出线缆是否有松动或破损;			
	SPO	输出侧缺相	输出 U、V、W 缺相或负载三	检查负载是否波动大和电机三相阻抗			
			相严重不对称。	是否平衡。			

「 に い て 深 圳市英威勝电 气限份有限公司 い い マ て に こ の 、 LTD.

故障类型

逆变模块过热

故障

485 通讯故障

障

GD290-2R2G/003P-4 0.78 0.95 1.03

可能的原因

电机容量与变频器容量不匹

表 A-1 能耗和 IE 等级 相对损耗(%)

GD290-0R7G/1R5P-4 0.89 1.05 1.19 1.13 1.21 1.42 1.61 2.13 9 IE2 GD290-1R5G/2R2P-4 0.82 0.99 1.11 1.09 1.19 1.34 1.53 2.06 13

GD290-003G/004P-4 0.71 0.87 0.95 0.79 0.97 1.13 1.26 1.91 21 IE2 GD290-004G/5R5P-4 0.82 0.97 1.18 1.02 1.20 1.73 1.52 2.11 15 IE2 GD290-5R5G/7R5P-4 0.75 0.83 1.09 0.93 1.02 1.57 1.43 1.95 17

GD290-011G/015P-4 0.63 0.87 1.59 0.65 1.36 1.70 1.45 1.94 27 IE2 GD290-015G/018P-4 0.78 1.01 1.55 1.29 1.55 1.83 1.64 2.06 30

GD290-022G/030P-4 0.83 1.05 1.88 1.31 1.89 2.05 1.97 2.12 30 IE2 GD290-030G/037P-4 0.71 0.98 1.76 1.22 1.83 1.96 1.92 2.07 30

GD290-045G/055P-4(-B) 0.63 0.94 1.48 1.18 1.55 1.91 1.74 2.06 31 IE2 GD290-055G/075P-4(-B) 0.52 0.80 1.35 1.06 1.42 1.84 1.67 1.96 32

GD290-090G/110P-4(-B) 0.50 0.73 1.28 0.97 1.12 1.74 1.33 2.03 32 IE2 GD290-110G/132P-4(-B) 0.42 0.69 1.20 0.84 0.98 1.67 1.27 1.95 34

0.64 1.05 1.41 1.35 1.42 1.87 1.49 2.00

0.61 1.01 1.32 1.26 1.33 1.82 1.42 1.97 36

0.48 0.81 1.33 0.99 1.08 1.89 1.28 1.99 39

0.47 0.79 1.30 0.96 1.05 1.87 1.24 1.96 40

0.41 0.75 1.28 0.89 1.01 1.82 1.19 1.91 42

0.53 0.98 1.28 1.21 1.29 1.79 1.37 1.94 37 IE2 0.65 0.91 1.45 1.14 1.25 1.92 1.34 2.01

0.72 1.01 1.87 1.35 1.71 1.92 1.79 2.00 43 IE2

0.68 0.98 1.92 1.27 1.56 1.88 1.62 1.94 44 IE2 0.66 0.94 1.88 1.19 1.47 1.83 1.56 1.91 45

0.63 0.87 1.71 1.08 1.39 1.79 1.48 1.89 48 IE2

0.61 0.84 1.67 1.02 1.31 1.74 1.42 1.87 50 IE2

0.70 0.82 1.52 1.08 1.27 1.83 1.37 1.93 52 IE2

0.69 0.78 1.40 0.90 1.10 1.79 1.25 1.89 55 IE2 
 0.66
 0.73
 1.32
 0.88
 1.07
 1.76
 1.21
 1.85
 55
 IE2

 0.63
 0.70
 1.27
 0.84
 1.02
 1.73
 1.16
 1.83
 58
 IE2

0.57 0.78 1.63 0.98 1.29 1.71 1.37 1.84 52

0.72 0.85 1.64 1.14 1.38 1.86 1.43 1.96

D290-075G/090P-4(-B) 0.42 0.69 1.04 0.98 1.19 1.72 1.45 1.91 33

GD290-132G/160P-4 0.70 1.14 1.50 1.44 1.51 1.91 1.58 2.03 34

GD290-7R5G/011P-4 0.81 1.07 1.71 0.83 1.52 1.83 1.62 2.08

GD290-018G/022P-4 0.72 0.95 1.43 1.20 1.44 1.72 1.52 1.97

GD290-037G/045P-4 0.45 0.61 1.12 1.05 1.23 1.87 1.47 2.06

0;25) (0;50) (0;100) (50;25) (50;50) (50;100) (90;50) (90;100)

自学习出的参数与标准

风道堵塞或风扇损坏;

环境温度过高;

长时间过载运行

波特率设置不当;

通讯线路故障;

通讯地址错误;

电机自学习故 电机参数设置不当;

通讯受到强干扰。

参数偏差过大;

自学习超时。

故障码

OH2

CE

tΕ

附录A 能效数据

变频器型号

GD290-160G-4

GD290-185P-4

GD290-200P-4

GD290-185G-4

GD290-200G-4

GD290-220P-4

GD290-250P-4

GD290-220G-4 GD290-250G-4

GD290-280G-4

GD290-280P-4

GD290-315P-4

GD290-355P-4 GD290-315G-4

GD290-355G-4 GD290-400G-4

GD290-400P-4 GD290-450P-4 Goodrive290 系列低压多功能通用变频器快速使用指南

疏通风道或更换风扇;

设置合适的波特率;

检查通讯接口配线;

设置正确通讯地址;

更换变频器型号;

0.86 1.07 1.23 1.35 1.99 17

2/3

选择功率更大的变频器。

纠正措施

保持现场通风顺畅,降低环境温度;

更换或更改配线,提高抗扰性。

正确设置电机类型和铭牌参数;

检查上限频率是否大于额定频率的

待机损耗 IE 等

IE2

IF2

IE2

IE2

IE2

IE2

IE2

IE2

IE2

25 IE2

30

30

35

38 IE2

50 IE2

(W) 级

使电机空载,重新辩识;

检查电机接线,参数设置;

Goodrive290 系列低压多功能通用变频器快速使用指南

	变频器型号	视在功率	额定输出功率		最高工作温度		额定电源电压
		(kVA)	(kW)	(A)	(°C)	率(Hz)	(V)
	GD290-185P-4	217	185	330			
	GD290-200P-4	250	200	380			
	GD290-185G-4	217	185	340			
	GD290-200G-4	250	200	365			
	GD290-220P-4	280	220	425			
ĺ	GD290-250P-4	316	250	460			
	GD290-220G-4	280	220	425			
	GD290-250G-4	316	250	480			
	GD290-280G-4	349	280	520			
	GD290-280P-4	349	280	530			
ſ	GD290-315P-4	395	315	600			
	GD290-355P-4	425	355	650			
	GD290-315G-4	395	315	600			
	GD290-355G-4	425	355	650			
	GD290-400G-4	474	400	720			
ſ	GD290-400P-4	474	400	720			
Ī	GD290-450P-4	540	450	820			
Ī	GD290-500P-4	566	500	860			

GD290-500P-4	0.60	0.68	1.23	0.81	0.97	1.69	1.11	1.80	60	IE2
表表表表										

变频器型号	视在功率 (kVA)	额定输出功率 (kW)	额定输出电流 (A)	最高工作温度 (°C)	额定电源频 率(Hz)	额定电源电压 (V)		
GD290-0R7G/1R5P-4	2.44	1.5	3.7					
GD290-1R5G/2R2P-4	3.98	2.2	5					
GD290-2R2G/003P-4	4.48	3	6.8					
GD290-003G/004P-4	6.2	4	9.5					
GD290-004G/5R5P-4	8.6	5.5	13					
GD290-5R5G/7R5P-4	12.2	7.5	17					
GD290-7R5G/011P-4	16.5	11	25					
GD290-011G/015P-4	21	15	32					
GD290-015G/018P-4	24	18.5	38	50°C 当温度超过 40° 50		2011 2001/		
GD290-018G/022P-4	30	22	45					
GD290-022G/030P-4	39.5	30	60	C 时,按照每升 高 1℃ 降额 1%		3PH 380V		
GD290-030G/037P-4	49	37	75	向ICP#初1%の 的比例降额。	47~0382			
GD290-037G/045P-4	60	45	92	1710171P4100				
GD290-045G/055P-4(-B)	75.7	55	115					
GD290-055G/075P-4(-B)	98.7	75	150					
GD290-075G/090P-4(-B) GD290-090G/110P-4(-B)	120	90	180					
	142	110	215					
GD290-110G/132P-4(-B)	172	132	250					
GD290-132G/160P-4	200	160	305					
GD290-160G-4	200	160	305					

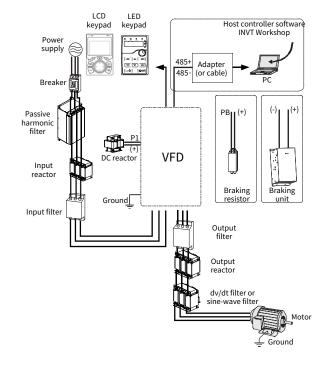


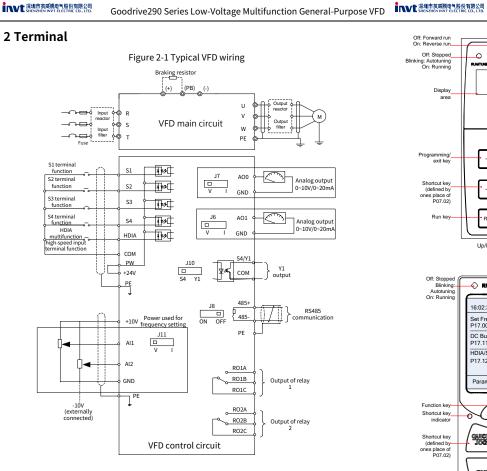
-7-

Goodrive290 Series Low-Voltage **Multifunction General-Purpose VFD Quick Start Guide** Scan the QR code to view This guide briefly describes the external wiring, terminals, the full version of the keypads, quick running, common function parameter settings, and common faults and solutions of product e-manual Goodrive290 series low-voltage multifunction general-purpose series VFD. Visit www.invt.com for more information and source download. For details, see the full version of corresponding product e-manual. 🛝 Warning This guide only provides the basic installation and commissioning information. Failure to comply with the safety instructions and installation and commissioning instructions in the relevant documentation may result in accidents such as equipment damage, personal injury, or even death. Only trained and qualified professionals are allowed to carry out related operations. Dang Do not perform any operations including wiring, inspection, or component replacement when power supply is applied. Before performing these operations, ensure all the input power supplies have been disconnected, and wait for at least the time designated on the VFD or until the DC bus voltage is less than 36V.

Minimum	VFD model					
waiting time						
5 minutes	3PH 380V 0.75–110kW					
15 minutes	3PH 380V 132–315kW					
20 minutes	3PH 380V >355kW					

## 1 External wiring



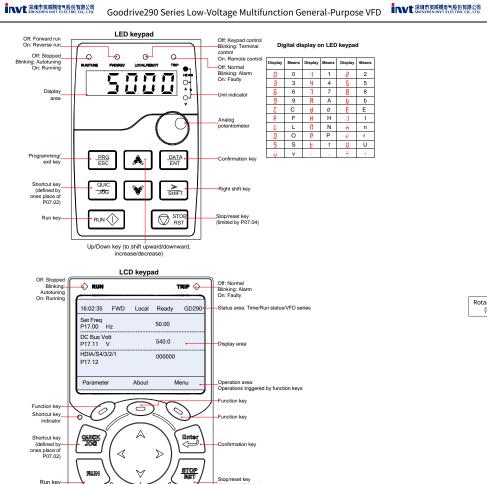


#### Table 2-1 VFD terminal description

Terminal	Description
	it terminals
R, S, T	3PH AC input terminals, connected to the grid
U, V, W	3PH AC output terminals, connected to the motor usually
(+)	(+) and (-) connect to external braking unit terminals or shared DC bus
(-)	terminals.
PB	PB and (+) connect to external braking resistor terminals.
Ð	PE terminal. The PE terminals of each machine must be grounded reliably.
Control ci	rcuit terminals
+10V	Locally provided 10V power supply
AI1	Analog input, using voltage input by default, which can be changed to current input through the corresponding jumper; input range: $0-10V/0-20mA$
AI2	Analog input. Input range: -10–10V
GND	+10V reference ground
AO0	Analog output, using voltage output by default, which can be changed to
A01	current output through the corresponding jumper; output range: 0–10V/0–20mA $% \left( 1-100000000000000000000000000000000000$
RO1A	Relay output. RO1A: NO; RO1B: NC; RO1C: common
RO1B	Relay output. RO2A: NO; RO2B: NC; RO2C: common
RO1C	Contact capacity: 3A/AC 250V, 1A/DC 30V
COM	+24V reference ground
485+ 485-	RS485 differential signal communication port. Use shielded twisted pairs for standard RS485 communication interfaces. You can determine whether to connect the 120 $\Omega$ terminal matching resistor of RS485 communication through the corresponding switch or jumper.
PE	Grounding terminal
PW	External power input terminal for digital input circuits. In NPN mode, short connect PW and +24V. In PNP mode, short connect PW and COM.
+24V	User power supply provided by the VFD. Max. output current: 200mA
	Digital input; max. frequency: 1kHz; internal impedance: $3.3 k\Omega$
S1-S4	Y1: open-collector output, sharing the terminal with S4; function selectable through a jumper.
HDIA	In addition to the digital input function, the terminal can also act as a high frequency pulse input channel. Max. input frequency: 50kHz

### 3 Keypad

The product is equipped with a standard LED keypad and supports an optional LCD keypad.



# 4 Quick running

#### 4.1 Check before power-on

Ensure that all terminals have been securely connected. Â Ensure that the motor power matches the VFD power.

Direction keys

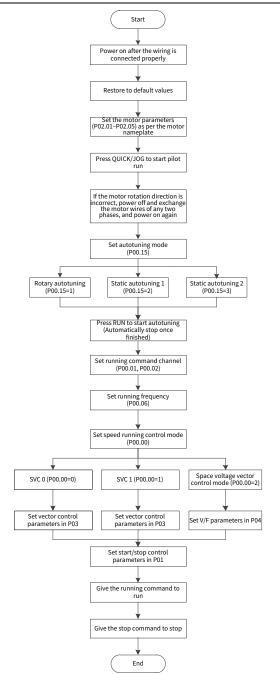
#### 4.2 Operating upon first power-on

(to inc

After confirming the wiring and power are correct, close the air switch of the AC power at the VFD input side to power on the VFD. Using a LED keypad for example, the keypad displays 8.8.8.8. upon power-on and then the set frequency (50.00 in the example), indicating the VFD is initialized and ready to run.



The quick startup flowchart is as follows:



### 5 Common function parameter setup

The following briefly describes only some common function parameters and typical values.

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

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

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

(The VFD automatically checks and constrains the modification of parameters, which helps prevent incorrect modifications.)

Function code	Name	Description	Default	Modify
P00.00	Speed control	0: SVC mode 0 1: SVC mode 1 2: Space voltage vector control mode	Model depended	0
P00.01	running	0: Keypad 1: Terminal 2: Communication	0	0
P00.03	Max. output frequency	P00.04-400.00Hz	50.00Hz	O
P00.04	Upper limit of running frequency	P00.05–P00.03 (Max. output frequency)	50.00Hz	O
P00.05	running	0.00Hz–P00.04 (Upper limit of running frequency)	0.00Hz	O

Function code	Name	Description	Default	Modify
	U	0: Keypad digital 1: Al1 2: Al2 3: Al3	0	0
P00.06	of A frequency command	1: AI1 2: AI2 3: AI3 4: High-speed pulse HDIA	0	0
	commund	5: Simple PLC program		
		6: Multi-step speed running		
		7: PID control		
		8: Modbus/Modbus TCP communication 9: PROFIBUS/CANopen communication		
		10: Ethernet communication		
	Setting channel	11–12: Reserved		
P00.07	0	13: EtherCAT/PROFINET/EtherNet IP	2	0
	command	communication		
		14: Programmable card 15–17: Reserved		
		18: Keypad analog input (only applicable		
		to 0R7G/1R5P-018G/022P)		
		<b>Note:</b> Options 1–3 are not valid for 0R7G/1R5P-018G/022P models.		
P00.10	Setting frequency	0.00Hz–P00.03 (Max. output frequency)	50.00Hz	0
	through keypad			-
P00.11 P00.12	ACC time 1 DEC time 1	0.0–3600.0s	Model depended	0
1 00.12	DEC time 1	0: Run at the default direction.	depended	0
P00.13	<b>Running direction</b>	1: Run at the opposite direction.	0	$\circ$
		2: Disable reverse running.		
	Motor parameter	0: No operation 1: Rotary autotuning		
P00.15		2: Static autotuning 1	0	$\bigcirc$
	5	3: Static autotuning 2		
	Function	0: No operation		
P00.18	parameter	1: Restore default values 2: Clear fault records	0	$\bigcirc$
	restoration	3: Lock all function codes		
	Running mode of	0: Direct start		
P01.00	start	1: Start after DC braking	0	O
P01.08	Stop mode	2: Start after speed tracking 0: Decelerate to stop 1: Coast to stop	0	0
101.00	Starting		Ŭ	0
P01.09	frequency of	0.00Hz–P00.03 (Max. output frequency)	0.00Hz	$\circ$
	braking for stop DC braking			
P01.11	current for stop	0.0–100.0%	0.00%	0
P01.12	DC braking time	0.00–50.00s	0.00s	0
	for stop Terminal-based			-
	running			
P01.18	command	0: Invalid at power-on 1: Valid at power-on	0	$\bigcirc$
	protection at			
	power-on Rated power of		Model	
P02.01	AM 1	0.1–3000.0kW	depended	O
P02.02	Rated frequency of AM 1	0.01Hz–P00.03 (Max. output frequency)	50.00Hz	$\bigcirc$
P02.03	Rated speed of	1–60000rpm	Model	0
. 02.03	AM 1		depended	
P02.04	Rated voltage of AM 1	0-1200V	Model depended	$\bigcirc$
P02.05	Rated current of	0.8–6000.0A	Model	0
, UZ.UJ	AM 1	0.0 0000.0A	depended	9
P03.00	Speed-loop proportional gain	0 0-200 0	20.0	0
. 03.00	proportional gain 1		20.0	
P03.01	Speed-loop	0.000–10.000s	0.200s	0
	integral time 1 Speed-loop			
P03.03	proportional gain	0.0–200.0	20.0	0
	2			
P03.04	Speed-loop integral time 2	0.000–10.000s	0.200s	0
	Current-loop			
P03.09	proportional	0–65535	1000	0
	coefficient P	0: Keypad (P03.12) 1: Keypad (P03.12)		
		2: Al1 3: Al2 4: Al3		
		5: Pulse frequency HDIA		
		6: Multi-step torque		
P03.11	Torque setting	7: Modbus/Modbus TCP communication 8: PROFIBUS/CANopen communication	0	0
	methou selection	9: Ethernet communication		
		10: Reserved		
		11: EtherCAT/PROFINET/EtherNet IP		
	1	communication		1

Function code	Name	Description	Default	Modify
		12: Programmable card 13–17: Reserved 18: Keypad analog input (only applicable to 0R7G/1R5P–018G/022P) <b>/ Note:</b> A non-zero value indicates		
	Torque boost of	torque mode. 0.0%: (Automatic torque boost),		
P04.01	motor 1	0.1%-10.0%	0.0%	0
P04.09	V/F slip compensation gain of motor 1	0.0–200.0%	100.0%	0
P04.10	Low-frequency oscillation control factor of motor 1	0-100	10	0
P04.11	High-frequency oscillation control factor of motor 1	0–100	10	0
P05.01	Function of S1	0: No function	1	$\bigcirc$
P05.02	Function of S2	1: Run forward (FWD)	4	$\bigcirc$
P05.03	Function of S3	2: Run reversely (REV)	7	$\bigcirc$
P05.04	Function of S4	3: Three-wire running control (SIN) 4: Jog forward 5: Jog reversely 6: Coast to stop 7: Reset faults 9: External fault input 10: Increase frequency setting (UP) 11: Decrease frequency setting (DOWN)	0	O
P05.37	AI2 lower limit	0.00V-P05.39	0.00V	0
P05.39	AI2 upper limit	P05.37–10.00V	10.00V	0
P05.39	Y1 output	0: Invalid	0	0
P06.03	11 Output	1: Running	1	0
P06.04	Relay output selection	2: Running forward 3: Running reversely 4: Jogging 5: VFD in fault 6: Frequency level detection FDT1	5	0
P06.14- P06.15	Analog output selection	8: Frequency reached 0: Running frequency 1: Set frequency	0	0
P06.16	pulse output	3: Rotation speed (Relative to twice the motor synchronous rotation speed) 4: Output current (relative to twice the VFD rated current) 5: Output current (relative to twice the motor rated current) 6: Output voltage (relative to 1.5 times the VFD rated voltage) 7: Output power (relative to twice the motor rated power)	0	0
P06.17- P06.26	AO output upper/lower limit settings	For details, see the full version of product e-manual.	-	0
P07.00	User password	0–65535	0	0
P14.00	Local communication address	1–247 <b>✓Note:</b> The communication address of a slave cannot be to 0.	1	0
P14.01	Communication baud rate setting	0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps	4	0
P14.02	Data bit check	0: No check (N, 8, 1) for RTU 1: Even check (E, 8, 1) for RTU 2: Odd check (O, 8, 1) for RTU 3: No check (N, 8, 2) for RTU 4: Even check (E, 8, 2) for RTU 5: Odd check (O, 8, 2) for RTU	1	0

# 6 Common faults and solutions

Fault code	Fault type	Possible cause	Solution
OUt1	Inverter unit U-phase protection	ACC/DEC is too fast. The IGBT module is damaged.	Increase ACC/DEC time. Change the inverter unit.
OUt2	Inverter unit V-phase protection	Misoperation is caused by interference. Drive wires are poorly	Check whether the devices and system are grounded reliably. Check for loose drive wires.
OUt3	Inverter unit W-phase protection	connected. To-ground short circuit occurred. Sparks have occurred inside due to poor use environment conditions.	Check for abnormal motor wiring and motor-to-ground short connection. Remove the dust or oil stain inside the VFD regularly.

Fau		Fault type	Possible cause	Solution
00	21	Overcurrent	/	Increase ACC/DEC time.
	-	during ACC	ACC/DEC is too fast.	Increase grid input voltage.
00	22	Overcurrent	The grid voltage is too low. The VFD power is too small.	Select a VFD with larger power. Check for motor stalling, short
		during DEC	A load transient or	connection, and load device
			exception has occurred.	exceptions.
		_	3PH output current	Check for abnormal VFD 3PH
		Overcurrent	imbalance.	output voltage and motor 3PH
00	23	during constant	There are strong external	resistance imbalance.
		speed running	interference sources	Check for strong interference
		. 0	(contactor switchover or improper grounding).	(whether motor cable is far away from contactor and system is
			improper grounding).	grounded reliably).
0		Overvoltage	ACC/DEC time is too short.	Increase ACC/DEC time.
٥V	/1	during ACC	Abnormal input voltage.	Check the input voltage.
OV	12	Overvoltage	The motor starts during	Use the speed tracking start
		during DEC	rotating.	function.
		Overvoltage	Load energy regeneration is too large.	Add dynamic braking devices or regenerative units.
٥V	/3	during constant	Dynamic braking is	Set dynamic braking function
		speed running		parameters.
		8	The grid voltage is too low.	
		Bus	Abnormal bus voltage	Increase grid input voltage.
U	V	undervoltage	display.	Contact the manufacturer.
		fault	Abnormal pre-charge	Contact the manufacturer.
			contactor closing. The grid voltage is too low.	
			The motor rated current is	Increase grid input voltage.
		Motor	set incorrectly.	Reset the motor rated current in
OL	-1	overload	Motor stalling has occurred	the motor parameter group. Check the load and adjust the
			or load sudden change is	torque boost value.
			too great.	
			ACC is too fast. The motor is restarted	Increase ACC time.
			during rotating.	Avoid restart upon stop or enable
OL	_2	VFD overload	The grid voltage is too low.	speed tracking start.
			Load is too large.	Increase grid input voltage. Select a VFD with larger power.
			VFD power is too small.	
			Phase loss or violent	Check whether the input power is
SF	Ы	Input side phase loss	fluctuation has occurred on inputs R, S, and T.	normal and input cables are loose. Set parameters to screen out the
		phase loss	Input-side screws are loose.	fault.
			Output cables are broken or	
			to-ground short circuit has	Check for loose or broken output cables.
SP	$\sim$	Output side	occurred.	Caples. Check for sharp load fluctuation
51	0	phase loss	U/V/W output phase loss or	and motor 3PH resistance
			severe three-phase load	imbalance.
			imbalance. The air duct is blocked or	
			the fan is damaged.	Ventilate the air duct or replace
OH	12	Inverter module	Ambient temperature is too	the fan. Keep good ventilation to lower
UF	12	overheating	high.	Keep good ventilation to lower ambient temperature.
		sterreuting	Long-time overload	Select a VFD with larger power.
			running.	<u> </u>
			Improper baud rate.	Set a proper baud rate. Check the communication port
		RS485	Communication line fault.	wiring.
CI	Е	communicatio	Incorrect communication	Set the communication address
		n fault	address. Communication suffers	correctly.
			from strong interference.	Replace or change wiring to
				enhance anti-interference.
			The motor capacity does	Change the VFD model. Set the motor type and nameplate
			not match the VFD capacity.	parameters correctly.
			Improper motor parameter	Empty the motor load and
tE	F	Motor-autotun		re-perform autotuning.
	-	ing fault	Autotuned parameter	Check motor wiring and
			settings deviate sharply	parameter settings.
			from the standard ones. Autotuning timeout.	Check whether the upper limit frequency is greater than 2/3 of
			Autotuning timeout.	the rated frequency.
L				and rated inequency.

# Appendix A Energy efficiency data

## Table A-1 Power loss and IE class

	Relative loss (%)									IE
VFD model	(0;25)	(0;50)	(0;100)	(50;25)	(50;50)	(50;100)	(90;50)	(90;100)	loss (W)	class
GD290-0R7G/1R5P-4	0.89	1.05	1.19	1.13	1.21	1.42	1.61	2.13	9	IE2
GD290-1R5G/2R2P-4	0.82	0.99	1.11	1.09	1.19	1.34	1.53	2.06	13	IE2
GD290-2R2G/003P-4	0.78	0.95	1.03	0.86	1.07	1.23	1.35	1.99	17	IE2
GD290-003G/004P-4	0.71	0.87	0.95	0.79	0.97	1.13	1.26	1.91	21	IE2
GD290-004G/5R5P-4	0.82	0.97	1.18	1.02	1.20	1.73	1.52	2.11	15	IE2
GD290-5R5G/7R5P-4	0.75	0.83	1.09	0.93	1.02	1.57	1.43	1.95	17	IE2

									at-i uipo.	
VED medal	VFD model Relative loss (%)							Standby	IE	
VFD model	(0;25)	(0;50)	(0;100)	(50;25)	(50;50)	(50;100)	(90;50)	(90;100)	loss (W)	class
GD290-7R5G/011P-4	0.81	1.07	1.71	0.83	1.52	1.83	1.62	2.08	25	IE2
GD290-011G/015P-4	0.63	0.87	1.59	0.65	1.36	1.70	1.45	1.94	27	IE2
GD290-015G/018P-4	0.78	1.01	1.55	1.29	1.55	1.83	1.64	2.06	30	IE2
GD290-018G/022P-4	0.72	0.95	1.43	1.20	1.44	1.72	1.52	1.97	30	IE2
GD290-022G/030P-4	0.83	1.05	1.88	1.31	1.89	2.05	1.97	2.12	30	IE2
GD290-030G/037P-4	0.71	0.98	1.76	1.22	1.83	1.96	1.92	2.07	30	IE2
GD290-037G/045P-4	0.45	0.61	1.12	1.05	1.23	1.87	1.47	2.06	30	IE2
GD290-045G/055P-4(-B)	0.63	0.94	1.48	1.18	1.55	1.91	1.74	2.06	31	IE2
GD290-055G/075P-4(-B)	0.52	0.80	1.35	1.06	1.42	1.84	1.67	1.96	32	IE2
GD290-075G/090P-4(-B)	0.42	0.69	1.04	0.98	1.19	1.72	1.45	1.91	33	IE2
GD290-090G/110P-4(-B)	0.50	0.73	1.28	0.97	1.12	1.74	1.33	2.03	32	IE2
GD290-110G/132P-4(-B)	0.42	0.69	1.20	0.84	0.98	1.67	1.27	1.95	34	IE2
GD290-132G/160P-4	0.70	1.14	1.50	1.44	1.51	1.91	1.58	2.03	34	IE2
GD290-160G-4	0.64	1.05	1.41	1.35	1.42	1.87	1.49	2.00	35	IE2
GD290-185P-4	0.61	1.01	1.32	1.26	1.33	1.82	1.42	1.97	36	IE2
GD290-200P-4	0.53	0.98	1.28	1.21	1.29	1.79	1.37	1.94	37	IE2
GD290-185G-4	0.65	0.91	1.45	1.14	1.25	1.92	1.34	2.01	38	IE2
GD290-200G-4	0.48	0.81	1.33	0.99	1.08	1.89	1.28	1.99	39	IE2
GD290-220P-4	0.47	0.79	1.30	0.96	1.05	1.87	1.24	1.96	40	IE2
GD290-250P-4	0.41	0.75	1.28	0.89	1.01	1.82	1.19	1.91	42	IE2
GD290-220G-4	0.72	1.01	1.87	1.35	1.71	1.92	1.79	2.00	43	IE2
GD290-250G-4	0.68	0.98	1.92	1.27	1.56	1.88	1.62	1.94	44	IE2
GD290-280G-4	0.66	0.94	1.88	1.19	1.47	1.83	1.56	1.91	45	IE2
GD290-280P-4	0.63	0.87	1.71	1.08	1.39	1.79	1.48	1.89	48	IE2
GD290-315P-4	0.61	0.84	1.67	1.02	1.31	1.74	1.42	1.87	50	IE2
GD290-355P-4	0.57	0.78	1.63	0.98	1.29	1.71	1.37	1.84	52	IE2
GD290-315G-4	0.72	0.85	1.64	1.14	1.38	1.86	1.43	1.96	50	IE2
GD290-355G-4	0.70	0.82	1.52	1.08	1.27	1.83	1.37	1.93	52	IE2
GD290-400G-4	0.69	0.78	1.40	0.90	1.10	1.79	1.25	1.89	55	IE2
GD290-400P-4	0.66	0.73	1.32	0.88	1.07	1.76	1.21	1.85	55	IE2
GD290-450P-4	0.63	0.70	1.27	0.84	1.02	1.73	1.16	1.83	58	IE2
GD290-500P-4	0.60	0.68	1.23	0.81	0.97	1.69	1.11	1.80	60	IE2

Table A-2 Rated specifications

VFD model	Apparent power (kVA)	Rated output power (kW)	Rated output current (A)	Max. working temperature (°C)	Rated power frequency (Hz)	Rated power voltage (V)
GD290-0R7G/1R5P-4	2.44	1.5	3.7			
GD290-1R5G/2R2P-4	3.98	2.2	5			
GD290-2R2G/003P-4	4.48	3	6.8			
GD290-003G/004P-4	6.2	4	9.5			
GD290-004G/5R5P-4	8.6	5.5	13			
GD290-5R5G/7R5P-4	12.2	7.5	17			
GD290-7R5G/011P-4	16.5	11	25			
GD290-011G/015P-4	21	15	32			
GD290-015G/018P-4	24	18.5	38			
GD290-018G/022P-4	30	22	45			
GD290-022G/030P-4	39.5	30	60			
GD290-030G/037P-4	49	37	75			
GD290-037G/045P-4	60	45	92			
GD290-045G/055P-4(-B)	75.7	55	115			
GD290-055G/075P-4(-B)	98.7	75	150			
GD290-075G/090P-4(-B)	120	90	180	50°C	50Hz/60Hz. Allowed range: 47–63Hz	3PH 380V
GD290-090G/110P-4(-B)	142	110	215			
GD290-110G/132P-4(-B)	172	132	250	Derate by 1%		
GD290-132G/160P-4	200	160	305	for every increase of 1°C		
GD290-160G-4	200	160	305	when the		
GD290-185P-4	217	185	330	temperature		
GD290-200P-4	250	200	380	exceeds 40°C.		
GD290-185G-4	217	185	340			
GD290-200G-4	250	200	365			
GD290-220P-4	280	220	425			
GD290-250P-4	316	250	460			
GD290-220G-4	280	220	425			
GD290-250G-4	316	250	480			
GD290-280G-4	349	280	520			
GD290-280P-4	349	280	530			
GD290-315P-4	395	315	600			
GD290-355P-4	425	355	650			
GD290-315G-4	395	315	600			
GD290-355G-4	425	355	650			
GD290-400G-4	474	400	720			
GD290-400P-4	474	400	720			
GD290-450P-4	540	450	820			
GD290-500P-4	566	500	860			

