

# Gooddrive290 系列低压多功能通用变频器

## 快速使用指南

本指南简要介绍了 Gooddrive290 系列低压多功能通用变频器的外围接线、端子、键盘、快速运行、常用功能参数设置、常见故障及对策。

拨打服务热线 400-700-9997 或访问 [www.invt.com.cn](http://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。



### 警告

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。

### 危险

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，须确认所有输入电源已断开，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
20分钟	3PH 380V 355kW 以上

## 1 外围接线

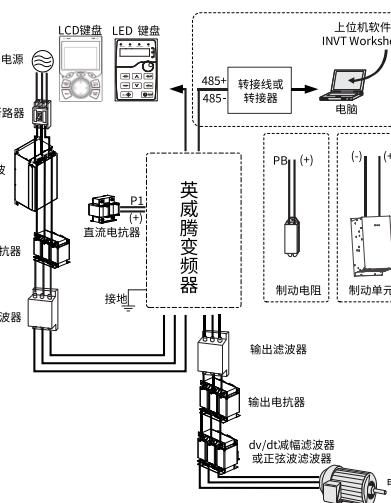


图 2-1 变频器典型接线图

## 2 端子

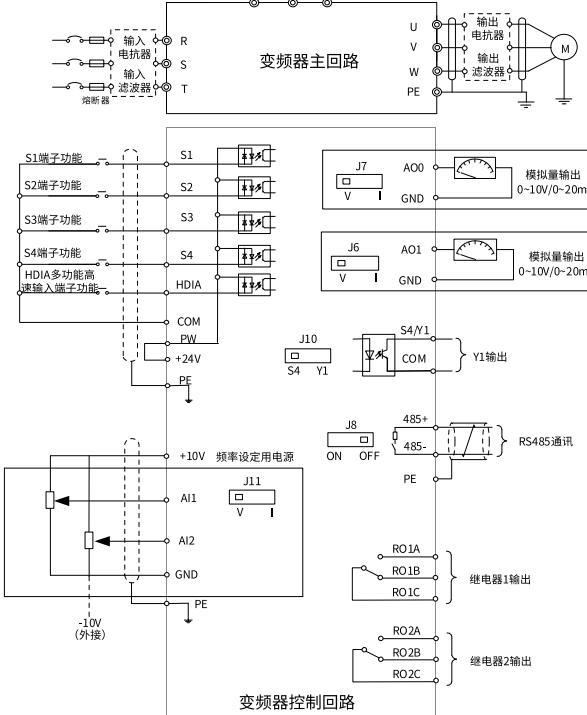
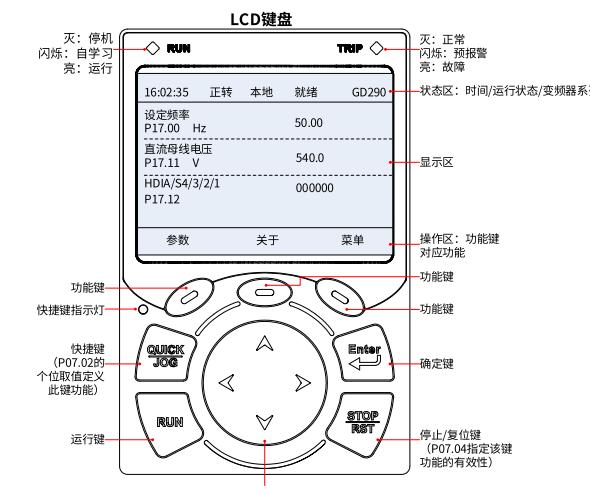
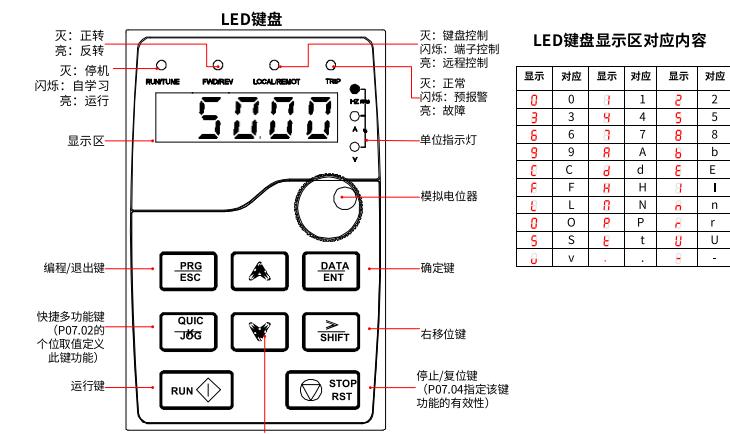


表 2-1 变频器端子说明

端子	说明
<b>主回路端子</b>	
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
(-)	(-) 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
	PE 端子，每台机器 PE 端子必须可靠接地
<b>控制回路端子</b>	
+10V	本机提供 10V 电源
A11	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
A12	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：0~10V/0~20mA
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
COM	+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

## 3 键盘

GD290 系列产品标配 LED 键盘，支持选配 LCD 键盘。



## 4 快速运行

### 4.1 上电前检查

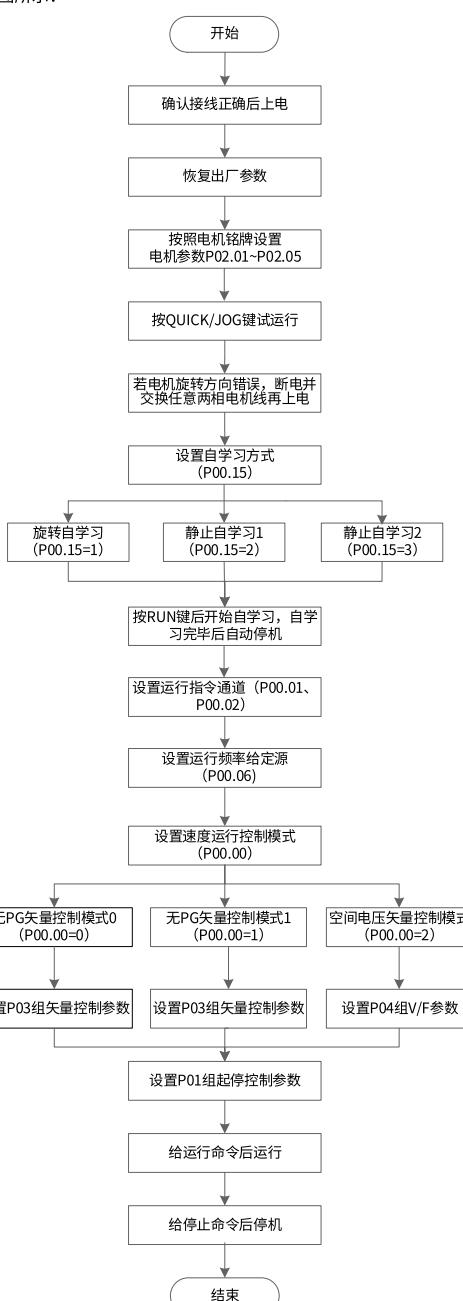
请确认所有的端子已正确紧固连接。  
请确认电机与变频器功率匹配。

## 4.2 首次上电操作

接线及电源检查确认无误后，合上变频器输入侧交流电源的空气开关，给变频器加电，以 LED 键盘为例（其他键盘参见产品完整版电子说明书），键盘首先显示“8.8.8.8.”，当数码管显示字符变为设定频率（例如 50.00）时，表明变频器已初始化完毕，变频器处于待机状态。



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。

- “○”：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
P00.00	速度控制模式	0: 无PG矢量控制模式0 1: 无PG矢量控制模式1 2: 空间电压矢量控制模式	机型确定	○
P00.01	运行指令通道	0: 键盘运行指令通道 1: 端子运行指令通道 2: 通讯运行指令通道	0	○
P00.03	最大输出频率	P00.04~400.00Hz	50.00Hz	○
P00.04	运行频率上限	P00.05~P00.03 (最大输出频率)	50.00Hz	○
P00.05	运行频率下限	0.00Hz~P00.04 (运行频率上限)	0.00Hz	○
P00.06	A频率指令选择	0: 键盘数字设定 1: 模拟量AI1设定	0	○
P00.07	B频率指令选择	0: 模拟量AI1设定 1: 模拟量AI2设定	2	○

功能码	名称	说明	缺省值	更改
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)			
<b>注意：1~3选项0R7G/1R5P~018G/022P机型无效。</b>				
P00.10	键盘设定频率	0.00Hz~P00.03 (最大输出频率)	50.00Hz	○
P00.11	加速时间1	0.0~3600.0s	机型确定	○
P00.12	减速时间1	0~3600.0s	机型确定	○
P00.13	运行方向选择	0: 默认方向运行 1: 相反方向运行 2: 禁止反转运行	0	○
P00.15	电机参数自学习	0: 无操作 1: 旋转自学习 2: 静止自学习1 3: 静止自学习2	0	○
P00.18	功能参数恢复	0: 无操作 1: 恢复缺省值 2: 清除故障档案 3: 功能码锁定 (锁定所有功能码)	0	○
P01.00	起动运行方式	0: 直接起动 1: 先直流制动再起动 2: 转速追踪再起动	0	○
P01.08	停机方式选择	0: 减速停车 1: 自由停车	0	○
P01.09	停机制动开始频率	0.00Hz~P00.03 (最大输出频率)	0.00Hz	○
P01.11	停机直流制动电流	0.0~100.0%	0.00%	○
P01.12	停机直流制动时间	0.00~50.00s	0.00s	○
P01.18	上电端子运行保护选择	0: 上电端子运行命令无效 1: 上电端子运行命令有效	0	○
P02.01	异步电机1额定功率	0.1~3000.0kW	机型确定	○
P02.02	异步电机1额定频率	0.01Hz~P00.03 (最大输出频率)	50.00Hz	○
P02.03	异步电机1额定转速	1~60000rpm	机型确定	○
P02.04	异步电机1额定电压	0~1200V	机型确定	○
P02.05	异步电机1额定电流	0.8~6000.0A	机型确定	○
P03.00	速度环比例增益1	0.0~20.0	20.0	○
P03.01	速度环积分时间1	0.000~10.000s	0.200s	○
P03.03	速度环比例增益2	0.0~20.0	20.0	○
P03.04	速度环积分时间2	0.000~10.000s	0.200s	○
P03.09	电流环比例系数P	0~65535	1000	○
P03.11	转矩设定方式选择	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 4: 模拟量AI3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)	0	○
<b>注意：非零取值即为转矩模式。</b>				
P04.01	电机1转矩提升	0.0%: (自动转矩提升), 0.1%~10.0%	0.0%	○
P04.09	电机1V/F转差补偿增益	0.0~200.0%	100.0%	○
P04.10	电机1低频抑制振荡因子	0~100	10	○
P04.11	电机1高频抑制振荡因子	0~100	10	○

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	<input type="radio"/>
P05.39	AI2上限值	P05.37~10.00V	10.00V	<input type="radio"/>
P06.01	Y1输出选择	0: 无效 1: 运行中 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	0	<input type="radio"/>
P06.03	继电器RO输出选择	1: 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	1	<input type="radio"/>
P06.04			5	<input type="radio"/>
P06.14~P06.15	AO模拟量输出选择	0: 运行频率 1: 设定频率 3: 行转速 (相对于2倍电机同步转速) 4: 输出电流 (相对于2倍变频器额定电流) 6: 输出电压 (相对于1.5倍变频器额定电压) 7: 输出功率 (相对于2倍电机额定功率)	0	<input type="radio"/>
P06.16	HDO高速脉冲输出选择		0	<input type="radio"/>
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。	-	<input type="radio"/>
P07.00	用户密码	0~65535	0	<input type="radio"/>
P14.00	本机通讯地址	1~247 注意: 从机地址不可为0。	1	<input type="radio"/>
P14.01	通讯波特率设置	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps	4	<input type="radio"/>
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	<input type="radio"/>

## 6 常见故障及对策

故障码	故障类型	可能的原因	纠正措施
OUT1	逆变单元 U 相保护	加减速太快; 该相IGBT内部损坏;	增大加减速时间; 更换逆变单元;
OUT2	逆变单元 V 相保护	干扰引起误动作; 驱动线连接不良;	检查设备和系统是否可靠接地;
OUT3	逆变单元 W 相保护	是否对地短路; 机器使用环境差导致内部出现火花。	检查电机线缆和电机对地是否有短路; 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; 电网电压偏低;	调高电网输入电压;
OC3	恒速过电流	变频器功率偏小; 负载突变或者异常; 三相输出电流不平衡; 外部存在强干扰源 (系统有接触器切换、系统接地不良)。	选择功率更大的变频器; 检查变频器是否堵转或短路, 是否负载设备存在异常; 检查变频器三相输出电压是否正常和电机三相阻抗是否平衡; 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)。
OV1	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;
OV3	恒速过电压	存在电机旋转中启动的现象; 负载存在较大能量回馈; 能耗制动功能未打开。	采用转速跟踪启动; 需增加能耗制动组件或能量回馈单元; 设置能耗制动功能参数。
UV	母线欠压故障	电网电压偏低; 母线电压显示异常;	调高电网输入电压; 联系厂家;
OL1	电机过载	电网电压过低; 电机额定电流设置不正确; 电机堵转或负载突变过大。	调高电网输入电压; 重新设置电机参数组的电机额定电流; 检查负载, 调节转矩提升量。
OL2	变频器过载	加速太快; 对旋转中的电机实施再启动; 电网电压过低; 负载过大; 变频器功率选型偏小。	增大加减速时间; 避免停机再启动或进行转速跟踪启动; 调高电网输入电压; 选择功率更大的变频器。
SPI	输入侧缺相	输入 R、S、T 缺相或波动过大; 输入侧螺丝松动。	检查输入电源是否正常和输入线缆是否有松动; 可选择设置参数屏蔽。
SPO	输出侧缺相	输出线缆有破损或对地短路; 输出 U、V、W 缺相或负载三相严重不对称。	检查输出线缆是否有松动或破损; 检查负载是否波动大和电机三相阻抗是否平衡。

故障码	故障类型	可能的原因	纠正措施
OH2	逆变模块过热故障	风道堵塞或风扇损坏; 环境温度过高; 长时间过载运行。	疏通风道或更换风扇; 保持现场通风顺畅, 降低环境温度; 选择功率更大的变频器。
CE	485 通讯故障	波特率设置不当; 通讯线路故障; 通讯地址错误; 通讯受到强干扰。	设置合适的波特率; 检查通讯接口配线; 设置正确通讯地址; 更换或更改配线, 提高抗干扰性。
tE	电机自学习故障	电机容量与变频器容量不匹配; 电机参数设置不当; 自学习出的参数与标准参数偏差过大; 自学习超时。	更换变频器型号; 正确设置电机类型和铭牌参数; 使电机空载, 重新辨识; 检查电机接线, 参数设置; 检查上限频率是否大于额定频率的2/3。

### 附录A 能效数据

表 A-1 能耗和 IE 等级

变频器型号	相对损耗 (%)								待机损耗 (W)	IE 等级
	(0;25)	(0;50)	(0;100)	(50;25)	(50;50)	(50;100)	(90;50)	(90;100)		
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
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							



Function code	Name	Description	Default	Modify
P00.06	Setting channel of A frequency command	0: Keypad digital 1: AI1 2: AI2 3: AI3 4: High-speed pulse HDIA 5: Simple PLC program 6: Multi-step speed running 7: PID control 8: Modbus/Modbus TCP communication 9: PROFIBUS/CANopen communication 10: Ethernet communication 11-12: Reserved 13: EtherCAT/PROFINET/EtherNet IP communication 14: Programmable card 15-17: Reserved 18: Keypad analog input (only applicable to 0R7G/1R5P-018G/022P) Note: Options 1-3 are not valid for 0R7G/1R5P-018G/022P models.	0	○
P00.07	Setting channel of B frequency command	0.00Hz-P00.03 (Max. output frequency)	50.00Hz	○
P00.10	Setting frequency through keypad	0.00Hz-P00.03 (Max. output frequency)	50.00Hz	○
P00.11	ACC time 1	0.0-3600.0s	Model depended	○
P00.12	DEC time 1			○
P00.13	Running direction	0: Run at the default direction. 1: Run at the opposite direction. 2: Disable reverse running.	0	○
P00.15	Motor parameter autotuning	0: No operation 1: Rotary autotuning 2: Static autotuning 1 3: Static autotuning 2	0	○
P00.18	Function parameter restoration	0: No operation 1: Restore default values 2: Clear fault records 3: Lock all function codes	0	○
P01.00	Running mode of start	0: Direct start 1: Start after DC braking 2: Start after speed tracking	0	○
P01.08	Stop mode	0: Decelerate to stop 1: Coast to stop	0	○
P01.09	Starting frequency of braking for stop	0.00Hz-P00.03 (Max. output frequency)	0.00Hz	○
P01.11	DC braking current for stop	0.0-100.0%	0.00%	○
P01.12	DC braking time for stop	0.00-50.0s	0.00s	○
P01.18	Terminal-based running command protection at power-on	0: Invalid at power-on 1: Valid at power-on	0	○
P02.01	Rated power of AM 1	0.1-3000.0kW	Model depended	○
P02.02	Rated frequency of AM 1	0.01Hz-P00.03 (Max. output frequency)	50.00Hz	○
P02.03	Rated speed of AM 1	1-60000rpm	Model depended	○
P02.04	Rated voltage of AM 1	0-1200V	Model depended	○
P02.05	Rated current of AM 1	0.8-6000.0A	Model depended	○
P03.00	Speed-loop proportional gain 1	0.0-200.0	20.0	○
P03.01	Speed-loop integral time 1	0.000-10.000s	0.200s	○
P03.03	Speed-loop proportional gain 2	0.0-200.0	20.0	○
P03.04	Speed-loop integral time 2	0.000-10.000s	0.200s	○
P03.09	Current-loop proportional coefficient P	0-65535	1000	○
P03.11	Torque setting method selection	0: Keypad (P03.12) 1: Keypad (P03.12) 2: AI1 3: AI2 4: AI3 5: Pulse frequency HDIA 6: Multi-step torque 7: Modbus/Modbus TCP communication 8: PROFIBUS/CANopen communication 9: Ethernet communication 10: Reserved 11: EtherCAT/PROFINET/EtherNet IP communication	0	○

Function code	Name	Description	Default	Modify
		12: Programmable card 13-17: Reserved 18: Keypad analog input (only applicable to 0R7G/1R5P-018G/022P) Note: A non-zero value indicates torque mode.		
P04.01	Torque boost of motor 1	0.0%: (Automatic torque boost), 0.1%-10.0%	0.0%	○
P04.09	V/F slip compensation gain of motor 1	0.0-200.0%	100.0%	○
P04.10	Low-frequency oscillation control factor of motor 1	0-100	10	○
P04.11	High-frequency oscillation control factor of motor 1	0-100	10	○
P05.01	Function of S1	0: No function 1: Run forward (FWD) 2: Run reversely (REV)	1	○
P05.02	Function of S2		4	○
P05.03	Function of S3	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)	7	○
P05.04	Function of S4		0	○
P05.37	AI2 lower limit	0.00V-P05.39	0.00V	○
P05.39	AI2 upper limit	P05.37-10.00V	10.00V	○
P06.01	Y1 output	0: Invalid 1: Running 2: Running forward 3: Running reversely 4: Jogging 5: VFD in fault 6: Frequency level detection FDT1 8: Frequency reached	0	○
P06.03			1	○
P06.04	Relay output selection		5	○
P06.14-P06.15	Analog output selection	0: Running frequency 1: Set frequency	0	○
P06.16	HDO high-speed 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	○
P06.17-P06.26	AO output upper/lower limit settings	For details, see the full version of product e-manual.	-	○
P07.00	User password	0-65535	0	○
P14.00	Local communication address	1-247 Note: The communication address of a slave cannot be to 0.	1	○
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	○
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	○

## 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 connected.	Check whether the devices and system are grounded reliably. Check for loose drive wires.
OUT3	Inverter unit W-phase protection	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.

Fault code	Fault type	Possible cause	Solution
OC1	Overcurrent during ACC	ACC/DEC is too fast.	Increase ACC/DEC time.
OC2	Overcurrent during DEC	The grid voltage is too low. The VFD power is too small.	Increase grid input voltage. Select a VFD with larger power.
OC3	Overcurrent during constant speed running	A load transient or exception has occurred. There are strong external interference sources (contactor switchover or imprecise grounding).	Check for motor stalling, short connection, and load device exceptions. Check for abnormal VFD 3PH output current imbalance. There are strong external interference sources (contactor switchover or imprecise grounding).
OV1	Overvoltage during ACC	ACC/DEC time is too short.	Increase ACC/DEC time.
OV2	Overvoltage during DEC	The motor starts during rotating.	Check the input voltage. Use the speed tracking start function.
OV3	Overvoltage during constant speed running	Load energy regeneration is too large. Dynamic braking is disabled.	Add dynamic braking devices or regenerative units. Set dynamic braking function parameters.
UV	Bus undervoltage fault	The grid voltage is too low. Abnormal bus voltage display.	Increase grid input voltage. Contact the manufacturer.
OL1	Motor overload	The grid voltage is too low. The motor rated current is set incorrectly. Motor stalling has occurred or load sudden change is too great.	Increase grid input voltage. Reset the motor rated current in the motor parameter group. Check the load and adjust the torque boost value.
OL2	VFD overload	ACC is too fast. The motor is restarted during rotating. The grid voltage is too low. Load is too large. VFD power is too small.	Increase ACC time. Avoid restart upon stop or enable speed tracking start. Increase grid input voltage. Select a VFD with larger power.
SPI	Input side phase loss	Phase loss or violent fluctuation has occurred on inputs R, S, and T. Input-side screws are loose.	Check whether the input power is normal and input cables are loose. Set parameters to screen out the fault.
SPO	Output side phase loss	Output cables are broken or to-ground short circuit has occurred. U/V/W output phase loss or severe three-phase load imbalance.	Check for loose or broken output cables. Check for sharp load fluctuation and motor 3PH resistance imbalance.
OH2	Inverter module overheating	The air duct is blocked or the fan is damaged. Ambient temperature is too high. Long-time overload running.	Ventilate the air duct or replace the fan. Keep good ventilation to lower ambient temperature. Select a VFD with larger power.
CE	RS485 communication fault	Improper baud rate. Communication line fault. Incorrect communication address. Communication suffers from strong interference.	Set a proper baud rate. Check the communication port wiring. Set the communication address correctly. Replace or change wiring to enhance anti-interference.
tE	Motor-autotuning fault	The motor capacity does not match the VFD capacity. Improper motor parameter setting. Autotuned parameter settings deviate sharply from the standard ones. Autotuning timeout.	Change the VFD model. Set the motor type and nameplate parameters correctly. Empty the motor load and re-perform autotuning. Check motor wiring and parameter settings. Check whether the upper limit frequency is greater than 2/3 of the rated frequency.

## Appendix A Energy efficiency data

Table A-1 Power loss and IE class

VFD model	Relative loss (%)								Standby loss (W)	IE class
	(0;25)	(0;50)	(0;100)	(50;25)	(50;50)	(50;100)	(90;50)	(90;100)		
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

VFD model	Relative loss (%)								Standby loss (W)	IE class
	(0;25)	(0;50)	(0;100)	(50;25)	(50;50)					