英威腾变频器简易通用手册

本手册简要介绍了英威腾变频器（以下简称“本产品”）的安全注意事项、外围接线、端子功能说明、快速运行、键盘简介、常用功能参数、常见故障及对策等部分内容。更多功能介绍请扫描本手册第 8 章节或变频器机身英威腾电子说明书平台二维码，查阅完整版电子说明书。

终端用户为军事单位，或将本产品用于兵器制造等用途时，请遵守《中华人民共和国对外贸易法》有关出口管制的相关规定，办理相应手续。

1 安全注意事项

1.1 警告标识

标识	名称	说明	简写
危险	危险	如不遵守相关要求，可能会造成严重的人身伤害，甚至死亡。	
警告	警告	如不遵守相关要求，可能造成人身伤害或者设备损坏。	
禁止	静电敏感	如不遵守相关要求，可能造成 PCBA 板损坏。	
高温	注意高温	变频器底座产生高温，禁止触摸。	
5 min	注意电击危险	为了防止电击危险，断电后母线电容上存在高压，请至少等待 5 分钟（或 15 分钟、25 分钟，具体请参考机器上的警告标识）去操作它。	5 min
	阅读说明书	操作设备之前请阅读说明书。	
注意	注意	为了确保正确的运行而采取的步骤。	注意

1.2 安全指导

✧ 只有经过培训并合格的人员才允许进行相关操作。

✧ 禁止在电源接通的情况下进行接线，检查和更换器件等作业。进行接线及检查之前，必须确认所有输入电源已经断开，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。等待时间表如下：

变频器机型		至少等待时间
单相 220V	0.2kW~2.2kW	5 分钟
三相 220V	0.2kW~2.2kW	5 分钟
三相 380V	0.75kW~110kW	5 分钟
三相 380V	132kW~315kW	15 分钟
三相 380V	355kW 以上	25 分钟
三相 660V	22kW~132kW	5 分钟
三相 660V	160kW~355kW	15 分钟
三相 660V	400kW~630kW	25 分钟

✧ 严禁对变频器进行未经授权的改装，否则可能引起火灾，触电或其他伤害。

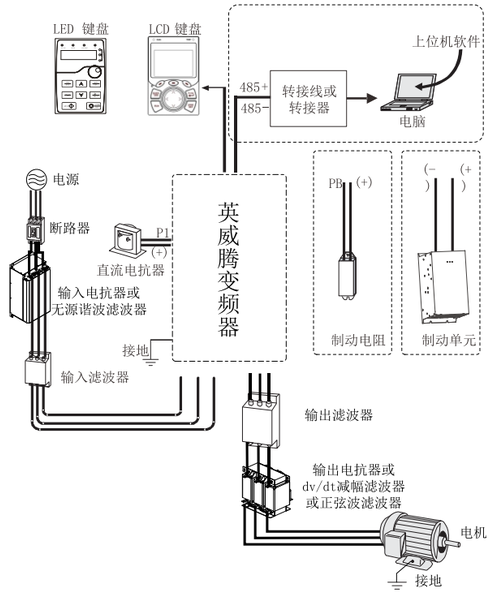
✧ 机器运行时，散热器底座可能产生高温，禁止触摸，以免烫伤。

✧ 变频器内电子元器件为静电敏感器件，在相关操作时，必须做好防静电措施。

1.3 环境条件

环境	条件
环境温度	✧ -10~+50℃； ✧ 当环境温度超过 40℃后，请按照 1℃降额 1%的比例降额； ✧ 我们不建议在 50℃以上的环境中使用变频器； ✧ 为了提高机器的可靠性，请在温度不会急剧变化的场所使用变频器； ✧ 在控制柜等封闭空间内使用时，请使用冷却风扇或冷却空调进行冷却，以避免内部温度超过条件温度； ✧ 温度过低时，在长时间断电后再上电运行，需增加外部加热装置，消除内部冻结现象，否则容易导致机器损坏。
湿度	✧ 空气的相对湿度小于 90%； ✧ 不允许凝露； ✧ 在存在腐蚀性气体的空间中，最大相对湿度不能超过 60%。
运行环境条件	请将变频器安装在如下场所： ✧ 远离电磁辐射源的场所； ✧ 无油雾、腐蚀性气体、易燃性气体、无放射性物质、无有害气体及液体的场所； ✧ 金属粉末、尘埃、油、水等异物不会进入变频器内部的场所（请不要把变频器安装在木材等易燃物上面）； ✧ 盐份少的场所； ✧ 无阳光直射的场所。
海拔高度	✧ 1000m 以下； ✧ 当海拔高度超过 1000m 以上，请按照 100m 降额 1%的比例降额； ✧ 当海拔高度超过 3000m，请与当地英威腾经销商或办事处联系，咨询详细信息。
振动	最大加速度不超过 5.8m/s²（0.6g）
安装方向	为了不使变频器的散热效果降低，请垂直安装

2 外围接线图



3 端子功能说明

表 3-1 主回路端子说明

端子符号	端子名称	功能描述
R（L）	三相（单相）主回路电源输入	三相（单相）交流输入端子，与电网连接
S（N）		
T		
U	变频器输出	三相交流输出端子，一般接电机
V		
W		
P1	直流电抗器端子	✧ P1、（+）外接直流电抗器端子 ✧ （+）、(-) 外接制动单元端子/共直流母线端子 ✧ PB、（+）外接制动电阻端子
（+）	直流电抗器端子、制动单元端子	
(-)	制动单元端子	
PB	制动电阻端子	
⏚	安全保护接地端子（PE）	每台机器 PE 端子必须可靠接地

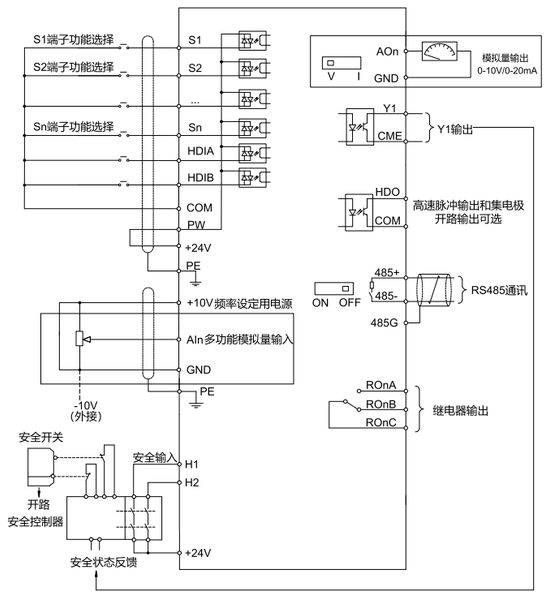


图 3-1 基本控制回路接线图

表 3-2 基本控制回路端子说明

端子名称	说明
+10V	本机提供 10V 电源
AIn	AI 为模拟量输入，默认为电压输入，可通过跳线帽/拨码开关/参数设置为电流输入。
GND	+10V 的参考零电位
AOn	模拟量输出范围：0~10V 电压或 0~20mA 电流；
RONA RONB RONC	继电器输出：RONA 常开，RONB 常闭，RONC 公共端； 触点容量：3A/AC250V，1A/DC30V。
HDO	开关容量：50mA/30V； 输出频率范围：0~50kHz；
COM	+24V 的公共端
CME	开路集电极输出的公共端，出厂时与 COM 短接
Y1~Yn	开关容量：50mA/30V； 输出频率范围：0~1kHz。
485+	485 通讯端口，485 差分信号端口，标准 485 通讯接口请使用双绞线屏蔽线，
485-	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	由外部向内部提供输入开关量工作电源。
24V	变频器提供用户电源，最大输出电流 200mA。
S1~Sn	开关量输入： 1. 内部阻抗：3.3kΩ 2. 可接受 12~30V 电压输入 3. 该端子为双向输入端子，支持 NPN 和 PNP 接法 4. 最大输入频率：1kHz 5. 全部为可编程数字量输入端子，用户可通过功能码设定端子功能
HDIA	除有开关量输入功能外，还可作为高频脉冲输入通道；
HDIB	最大输入频率：50kHz； 占空比：30%~70%； 支持正交编码器输入，具有测速功能。（只有同时有 HDIA 和 HDIB 才支持正交编码器输入）
+24V—H1	STO 输入 1
+24V—H2	STO 输入 2
	1、 安全转矩停止（STO）冗余输入，外接常闭触点，触点断开时 STO 动作，变频器停止输出； 2、 安全输入信号线使用屏蔽线，接线长度控制在 25 米以内； 3、 出厂时 H1、H2 端子均与+24V 短接，使用 STO 功能时需要将端子上的短接片拆除。

注意：

● n 为自然数。

● 详细端子接线示意图参见对应系列正版完整电子说明书，请扫描本手册第 8 章节或变频器机身二维码获取。

4 快速运行说明

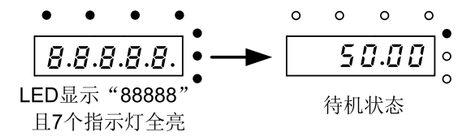
4.1 上电前检查

✧ 请确认所有的端子已正确紧固连接。

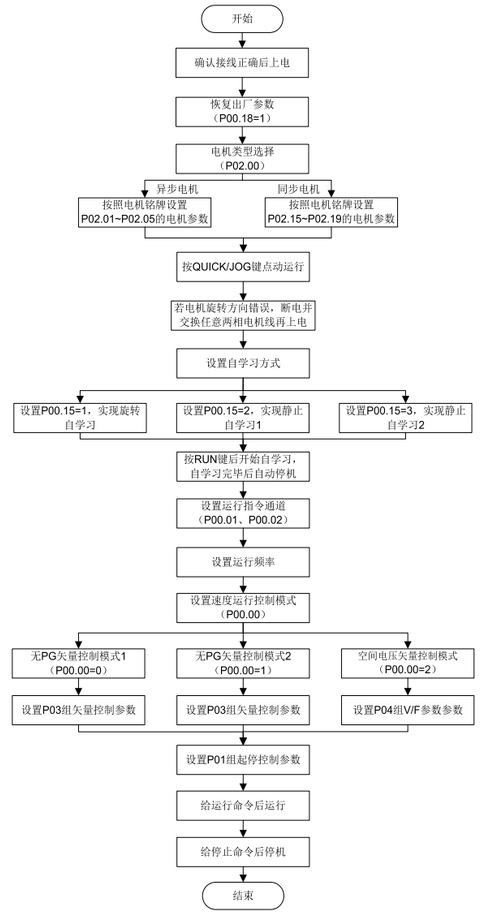
✧ 请确认电机与变频器功率是否匹配。

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，以带 LED 键盘变频器为例（其他键盘参见对应系列完整版说明书），键盘首先显示“8.8.8.8.8.”，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 键盘简介

表 5-1 LED 键盘简介

名称	说明		
状态指示灯	RUN/TUNE		灯灭时表示变频器处于停机状态；灯闪烁表示变频器处于参数自学习状态；灯亮时表示变频器处于运转状态；
	FWD/REV		正反转指示灯；灯灭表示处于变频器正转状态；灯亮表示变频器处于反转状态。
	LOCAL/REMOT		键盘操作，端子操作与远程通讯控制的指示灯。 灯灭表示键盘操作控制状态；灯闪烁表示端子操作控制状态；灯亮表示处于远程操作控制状态
	TRIP		故障指示灯；当变频器处于故障状态下，该灯点亮；正常状态下为熄灭；当变频器在预报警状态下，该灯闪烁。
单位指示灯	表示键盘当前显示的单位。		
	Hz	频率单位	
	RPM	转速单位	
	A	电流单位	
	%	百分数	
	V	电压单位	
数码显示区	5 位 LED 显示，显示设定频率、输出频率等各种监视数据以及报警代码。		

显示字母	对应字母	显示字母	对应字母	显示字母	对应字母
0	0	1	1	2	2
3	3	4	4	5	5
6	6	7	7	8	8
9	9	A.	A	b.	B
C.	C	d	d	E.	E
F.	F	H.	H	I.	I
L.	L	n.	N	n	n
o	o	P.	P	r	r
S.	S	t.	t	U.	U
v	v	.	.	-	-

数字电位器	调节频率。请参考功能码 P08.41 的内容。		
按钮区	PRG ESC	编程键	一级菜单进入或退出，快捷参数删除
	DATA ENT	确定键	逐级进入菜单画面、设定参数确认

名称	说明		
	▲	UP 递增键	数据或功能码的递增
	▼	DOWN 递减键	数据或功能码的递减
	SHIFT	右移位键	在停机显示界面和运行显示界面下，可右移循环选择显示参数；在修改参数时，可以选择参数的修改位
	RUN	运行键	在键盘操作方式下，用于运行操作
	STOP RST	停止/复位键	运行状态时，按此键可用于停止运行操作；该功能码 P07.04 制约。故障报警状态时，所有控制模式都可用该键来复位操作
	QUICK JOG	快捷多功能键	该键功能由功能码 P07.02 个位确定 0：无功能 1：点动运行 2：移位键切换显示状态 3：正转反转切换 4：清除 UP/DOWN 设定 5：自由停车 6：实现运行命令给定方式按顺序切换 7：快速调试模式

表 5-2 LCD 键盘简介

名称	说明		
状态指示灯	RUN		运行指示灯； 灯灭表示：变频器处于停机状态； 灯闪烁表示：变频器处于参数自学习状态； 灯亮表示：变频器处于运转状态
	TRIP		故障指示灯； 灯点亮表示：故障状态下； 灯熄灭表示：正常状态下； 灯闪烁表示：预报警状态下
	QUICK/JOG		快捷键指示灯，根据快捷键不同的功能显示状态不同，详细参考 QUICK/JOG 键定义
按钮区		功能键	功能键的功能根据不同的菜单有不同的功能； 功能键的功能在显示区的页脚显示
	QUICK JOG	快捷键	可重定义，出厂默认为 JOG 功能，即点动运行。快捷键的功能选择根据功能码 P07.02 个位选择
	Enter	确定键	确定键的功能根据不同的菜单有不同的功能，如参数设定确定，参数选择确定，进入下一级菜单等。
	RUN	运行键	在键盘操作方式下，用于运行操作或自学习运行操作。
	STOP RST	停止/复位键	运行状态时，按此键可用于停止运行操作或自学习运行操作；该功能码 P07.04 制约。故障报警状态时，所有控制模式都可用该键来复位操作。
		方向键 上键：▲ 下键：▼ 左键：◀ 右键：▶	根据不同的界面有不同的功能： 上键：显示项目上移，选择项目上移，变更数字等； 下键：显示项目下移，选择项目下移，变更数字等； 左键：监控页面切换，光标左移，退出当前菜单返回到上一级菜单/等； 右键：监控页面切换，光标右移，由前菜单进入到下一级菜单等。
显示区	LCD 屏	显示屏	240*160 点阵液晶显示屏，可同时显示 3 项监控参数或 6 项子菜单项目
其他	RJ45 接口	RJ45 接口	连接变频器
	电池盖	时钟用电池盖	更换或安装时钟用电池时拆下，装上电池后盖上
	USB 端子	mini USB 端子	通过转接器，与 U 盘连接接口

注意：LCD 键盘根据机型确定，部分不支持。

6 常用功能参数设置

下述功能参数表中列出部分常见功能码，并对功能码进行简要描述。

“○”：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	参数详细说明	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 3：闭环矢量控制模式	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	设定范围：P00.04~400.00Hz **注意：**Goodrive350为P00.04~630.00Hz	50.00Hz	◎

功能码	名称	参数详细说明	缺省值	更改
P00.04	运行频率上限	设定范围：P00.05~P00.03（最大输出频率）	50.00Hz	◎
P00.05	运行频率下限	设定范围：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：键盘模拟量AI1设定（对应键盘电位器） 2：端子模拟量AI2设定（对应端子AI） 3：模拟量AI3设定 4：高速脉冲HDI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通讯设定	0	○
P00.07	B频率指令选择		2	○
P00.10	键盘设定频率	0.00 Hz~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		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	设定范围：0.00Hz~P00.03（最大输出频率）	0.00Hz	○
P01.11	停机直流制动电流	设定范围：0.0~100.0%	0.00%	○
P01.12	停机直流制动时间	设定范围：0.00~50.00s	0.00s	○
P01.18	上电端子运行保护选择	0：上电时端子运行命令无效 1：上电时端子运行命令有效	0	◎
P02.00	电机1类型	0：异步电机 1：同步电机	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	1~36000rpm **注意：**Goodrive350为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	◎
P02.15	同步电机1额定功率	0.1~3000.0kW	机型确定	◎
P02.16	同步电机1额定频率	0.01Hz~P00.03（最大输出频率）	50.00Hz	◎
P02.17	同步电机1极对数	1~128	2	◎
P02.18	同步电机1额定电压	0~1200V	机型确定	◎
P02.19	同步电机1额定电流	0.8~6000.0A	机型确定	◎
P02.23	同步电机1反电势	0~10000	300	○
P03.00	速度环比例增益1	0.0~200.0	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1	0.0~200.0	20.0	○
P03.04	速度环积分时间1	0.000~10.000s	0.200s	○
P03.09	电流环比例系数P	0~65535	1000	○
P04.01	电机1转矩提升	设定范围：0.0%：（自动）0.1%~10.0%	0	○
P04.09	电机1 V/F转差补偿增益	0.0~200.0%	0.0%	○
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	○
P05.01	S1端子功能选择	0：无功能 1：正转运行（FWD 2：反转运行（REV） 3：三线式运行控制（Sln） 4：正转寸动 5：反转寸动 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）	1	◎
P05.02	S2端子功能选择		4	◎
P05.03	S3端子功能选择		7	◎
P05.04	S4端子功能选择		0	◎
P05.37	AI2下限值	设定范围：0.00V~P05.39 **注意：**Goodrive350系列为P05.29	0.00V	○
P05.39	AI2上限值	设定范围：P05.37~10.00V **注意：**Goodrive350系列为P05.35	10.00V	○
P06.01	Y1输出选择	0：无效	0	○
P06.03~ P06.04	继电器RO输出选择	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	1	○

功能码	名称	参数详细说明	缺省值	更改
		6：频率水平检测FDT1 8：频率到达		
P06.14~ P06.15	AO模拟量输出选择	0：运行频率 1：设定频率 3：运行转速（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） 5：输出电流（相对于2倍电机额定电流） 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 0	○ ○
P06.16	HDO高速脉冲输出选择		0	○
P06.17~ P06.26	AO输出上下限设置	功能码说明、AO输出上下限及百分比等详细内容请扫描电子说明书平台二维码，查阅完整版电子说明书。		○
P07.00	用户密码	0~65535	0	○
P14.00	本机通讯地址	1~247 **注意：**从机地址不可设置为0。	1	○
P14.01	通讯波特率设置	0：1200BPS 1：2400BPS 2：4800BPS 3：9600BPS 4：19200BPS 5：38400BPS	4	○
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	○

7 常见故障及对策

本部分内容为常见故障代码，并对故障代码的可能原因和纠正措施进行简要描述。

故障代码	故障类型	可能的原因	纠正措施
OUt1	逆变单元 U 相保护	加速太快； 该相 IGBT 内部损坏； 干扰引起误动作； 驱动线连接不良； 是否对地短路	增大加速时间； 更换功率单元； 请检查驱动线； 检查外围设备是否有强干扰源
OUt2	逆变单元 V 相保护		
OUt3	逆变单元 W 相保护		
OV1	加速过电压	减速时间过短； 输入电压异常； 存在较大能量回馈； 缺失制动组件； 能耗制动功能未打开	检查输入电源； 检查负载减速时间是否过短； 需增加能耗制动组件； 检查相关功能码的设置
OV2	减速过电压		
OV3	恒速过电压		
OC1	加速过电流	加减速太快； 电网电压偏低； 变频器功率偏小； 负载突变或者异常； 对地短路，输出缺相； 外部存在强干扰源； 过流失速保护未开启	增大加减速时间； 检查输入电源； 选用功率大一档的变频器； 检查负载是否存在短路（对地短路或者线间短路）或者堵转现象； 检查输出配线； 检查是否存在强干扰现象； 检查相关功能码的设置
OC2	减速过电流		
OC3	恒速过电流		
UV	母线欠压故障	电网电压偏低； 过压失速保护未开启	检查电网输入电源； 检查相关功能码的设置
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	检查电网电压； 重新设置电机额定电流； 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； 小马拉大车	增大加速时间； 避免停机再启动； 检查电网电压； 选择功率更大的变频器； 选择合适的电机
SPI	输入侧缺相	输入 R，S，T 有缺相或者波动大	检查输入电源； 检查安装配线
SPO	输出侧缺相	U，V，W 缺相输出（或负载三相严重不对称）	检查输出配线； 检查电机及电缆
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； 降低环境温度
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，提高抗扰性
dEu	速度偏差故障	负载过重或者被堵转	检查负载，确认负载正常，增加检出时间； 检查控制参数是否合适。
STo	失调故障	同步电机控制参数设置不当； 自学习参数不准； 变频器未接电机。	检查负载，确认负载正常； 检查控制参数是否设置正确； 增加失调检出时间。

8 更多服务

想了解关于产品的任何信息均可联系我们，在咨询时请提供产品型号及所需要资料的产品序列号。

您可通过以下方式获取相关信息和服务：

1、 拨打我司全国统一服务热线：400-700-9997；

2、 联系我司 INVT 办事处；

3、 访问网页 www.invt.com.cn，或扫描官方网站二维码/官方微信。

4、 扫描电子说明书平台二维码或变频器机身电子说明书平台二维码，选择对应的产品系列，可在线查看完整说明书并支持检索功能。

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202512 (V1.4)

INVT VFD General Quick Start Guide

This guide describes the instructions of operating INVT variable-frequency drive (VFD), including information about the safety precautions, terminal functions, quick startup, common function parameters, keypad, external wiring, and common faults. Please scan the e-manual platform QR code provided in part 8 or marked on the VFD housing for more information.

If the end user is a military unit or the product is used for weapon manufacturing, please comply with relevant export control regulations in the *Foreign Trade Law of the People's Republic of China*, and complete necessary formalities.

1 Safety precautions

1.1 Warning

Symbol	Name	Description	Abbreviation
Danger	Danger	Severe personal injury or even death can result if related requirements are not followed.	
Warning	Warning	Personal injury or equipment damage can result if related requirements are not followed.	
Forbid	Electrostatic sensitive	The PCBA may be damaged if related requirements are not followed.	
Hot	Note Hot sides	Do not touch. The VFD base may become hot.	
5 min	Electric shock	As high voltage still presents in the bus capacitor after power off, wait for at least five minutes (or 15 min / 25 min, depending on the warning symbols on the machine) after power off to prevent electric shock.	5 min
	Read manual	Read the operation manual before operating the equipment.	
Note	Note	Actions taken to ensure proper running.	Note

1.2 Safety guidelines

✧ Only trained and qualified professionals are allowed to carry out related operations.
✧ Do not perform wiring, inspection or component replacement when power supply is applied. Ensure all the input power supplies have been disconnected before wiring or inspection, and wait for at least the time designated on the VFD or until the DC bus voltage is less than 36V. The minimum waiting time is listed in the following.

VFD model		Minimum waiting time
Single phase 220V	0.2–2.2kW	5 minutes
3PH 220V	0.2–2.2kW	5 minutes
3PH 380V	0.75kW–110kW	5 minutes
3PH 380V	132kW–315kW	15 minutes
3PH 380V	Higher than 355kW	25 minutes
3PH 660V	22kW–132kW	5 minutes
3PH 660V	160kW–355kW	15 minutes
3PH 660V	400kW–630kW	25 minutes

✧ Do not modify the VFD unless authorized; otherwise fire, electric shock or other injury may result.

✧ The base may become hot when the machine is running. Do not touch. Otherwise, you may get burnt.

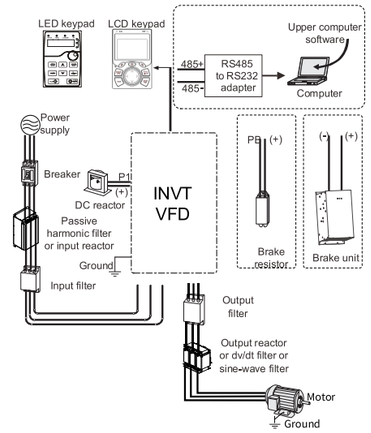
✧ The electrical parts and components inside the VFD are electrostatic sensitive. Take measures to prevent electrostatic discharge when performing related operations.

1.3 Environment condition

Environment	Condition
Ambient temperature	✧ -10–+50°C ✧ When the temperature exceeds 40°C, derate by 1% for every increase of 1°C. ✧ Do not use the VFD when the ambient temperature exceeds 50℃. ✧ In order to improve reliability, do not use the VFD in the places where the temperature changes rapidly. ✧ When the product is used in a closed space, such as control cabinet, use a cooling fan or air conditioner for cooling, preventing the internal temperature from exceeding the temperature required. ✧ When the temperature is too low, if you want to use the product that has been idled for a long time, install an external heating device before the use to eliminate the freeze inside the product. Otherwise, the product may be damaged.
Humidity	✧ RH: less than 90% ✧ Condensation is not allowed. ✧ The max. RH cannot exceed 60% in the environment where there are corrosive gases.
Running environment	Install the VFD in a place: ✧ Away from electromagnetic radiation sources

Environment	Condition
	✧ Away from places with oil mist, corrosive gases, combustible gases, radioactive material, or harmful gas or liquid ✧ Without the chance for foreign objects such as metal powder, dust, oil and water to fall into the VFD (do not install the VFD onto combustible objects such as wood) ✧ With low salt content. ✧ Without direct sunlight.
Altitude	✧ Lower than 1000m ✧ When the altitude exceeds 1000m, derate by 1% for every increase of 100m. ✧ When the installation site altitude exceeds 3000m, consult the local INVT dealer or office.
Vibration	The max. amplitude of vibration cannot exceed 5.8m/s^2 (0.6g).
Installation direction	Install the VFD vertically to ensure good heat dissipation performance.

2 Peripheral wiring



3 Terminal function

Table 3-1 Main circuit terminal description

Terminal symbol	Terminal name	Function description
R (L)	3PH (or 1PH) main circuit Power input	3PH (or 1PH) AC input terminals, connected to the grid
S (N)		
T		
U	VFD outputs	3PH AC output terminals, connected to the motor usually
V		
W		
P1	DC reactor terminal	✧ P1 and (+) connect to external DC reactor terminals. ✧ (+) and (-) connect to external braking unit terminals or the shared DC bus terminals. ✧ PB and (+) connect to external braking resistor terminals.
(+)	DC reactor terminal, Braking unit terminal	
(-)	Braking unit terminal	
PB	Braking resistor terminal	
⏚	Grounding terminal for safe protection (PE)	The PE terminals of each machine must be grounded reliably.

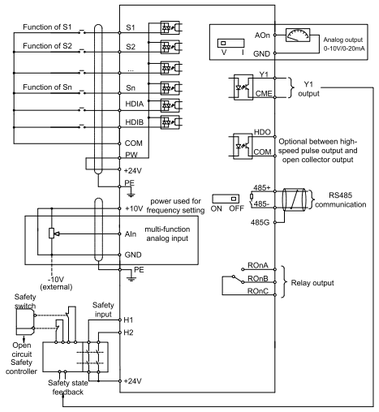


Figure 3-1 Wiring diagram of basic control circuit

Table 3-2 Control circuit terminals

Terminal name	Description
+10V	Locally provided 10V power supply
AIn	AI is an analog input, defaults to a voltage input, and can be set to a current input via a jumper cap/DIP switch/parameter.
GND	Reference zero potential of +10V
AOn	Analog output range: 0–10V or 0–20mA
ROnA	Relay output. ROnA: NO; ROnB: NC; ROnC: common；Contact capacity: 3A/AC250V, 1A/DC30V
ROnB	
ROnC	
HDO	Switch capacity: 50mA/30V Output frequency range: 0–50kHz
COM	Common terminal of +24V
CME	Common terminal of open collector output; short connected to COM by default
Y1–Yn	Switch capacity: 50mA/30V Output frequency range: 0–1kHz
485+	RS485 communication port, RS485 differential signal port and standard RS485 communication port must use twisted shielded pairs; 120Ω terminal matching resistor for RS485 communication is connected through the DIP switch or jumper.
485-	
PE	Grounding terminal
PW	External power input terminal for digital input circuits.
24V	User power supply provided by the VFD. Max. output current: 200mA
S1–Sn	Digital input: 1. Internal impedance: 3.3kΩ 2. 12–30V voltage input is acceptable. 3. Bi-direction input terminal, supporting both NPN and PNP 4. Max. input frequency: 1kHz 5. All are programmable digital input terminals, the functions of which can be set through function codes
HDIA	In addition to digital input functions, the terminal can also act as a high frequency pulse input channel. Max. input frequency: 50kHz Duty ratio: 30%–70% Supporting quadrature encoder input; with the speed measurement function (only support for quadrature encoder input when both HDIA and HDIB are available)
HDIB	
+24V—H1	STO input 1: 1. Safe torque off (STO) redundant input, connected to the external NC contact. When the contact opens, STO acts and the VFD stops output. 2. Safety input signal wires use shielded wires whose length is within 25m. 3. The H1 and H2 terminals are short connected to +24V by default. Remove the short connectors from the terminals before using STO function.
+24V—H2	STO input 2

Note:

- N is a natural number.
- For detailed terminal wiring diagrams, please refer to the full e-manual for the corresponding series, which can be obtained by scanning part 8 of this manual or the QR code of the VFD.

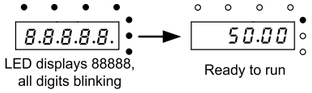
4 Quick startup

4.1 Check before power-on

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

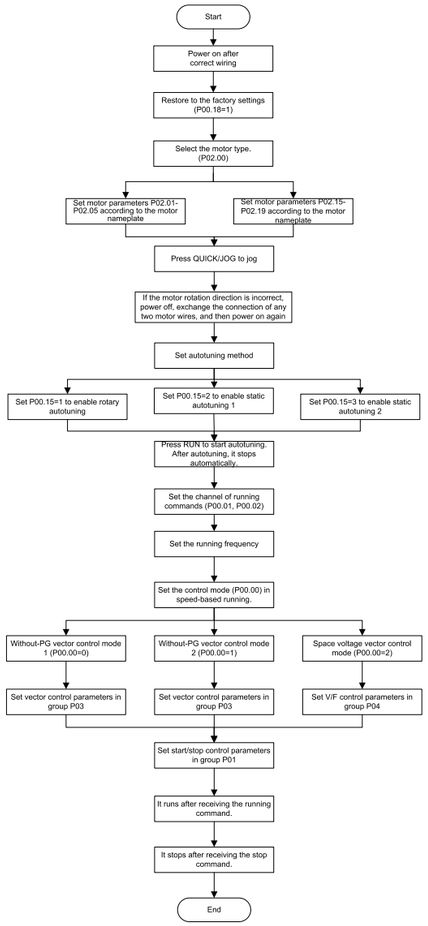
4.2 First power-on

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 8.8.8.8.8. upon power-on and then the set frequency (50.00 in the example), indicating the VFD is initialized and ready to run. (For details about other series of keypad, see the corresponding product e-manual of full version.)



LED displays 88888, all digits blinking — Ready to run

The quick startup diagram is as follows:



5 Keypad

Table 5-1 LED keypad introduction

Name	Description		
Status indicator	RUN/TUNE	VFD running status indicator. LED off: The VFD is stopped. LED blinking: The VFD is autotuning parameters. LED on: The VFD is running.	
	FWD/REV	FWD/REV running indicator. Off: The VFD is running forward. On: The VFD is running reversely.	
	LOCAL/REMOT	Indicates whether the VFD is controlled through the keypad, terminals, or communication. Off: The VFD is controlled through the keypad. Blinking: The VFD is controlled through terminals. On: The VFD is controlled through remote communication.	
	TRIP	Fault indicator. On: in fault state. Off: in normal state. Blinking: in pre-alarm state	
Unit indicator	Unit displayed currently		
	Hz	Frequency unit	
	RPM	Rotation speed unit	
	A	Current unit	
	%	Percentage	
	V	Voltage unit	
Digital display zone	Five-digit LED displays various monitoring data and alarm codes such as the frequency setting and output frequency.		

Display	Means	Display	Means	Display	Means
0	0	1	1	2	2
3	3	4	4	5	5
6	6	7	7	8	8
9	9	A.	A	b.	B
C.	C	d	d	E.	E
F.	F	H.	H	I.	I
L.	L	n.	N	n	n
o	o	P.	P	r	r
S.	S	t	t	U.	U
v	v	.	.	-	-

Name	Description		
Digital potentiometer	For frequency regulation. For details, see the description of P08.41.		
Keys	PRG ESC	Programming key	Press it to enter or exit level-1 menus or delete a parameter.
	DATA ENT	Confirmation key	Press it to enter menus in cascading mode or confirm the setting of a parameter.
		UP Up key	Press it to increase data or move upward.
		Down key	Press it to decrease data or move downward.
	SHIFT	Right-shifting key	Press it to select display parameters rightward in the interface for the product in stopped or running state or to select digits to change during parameter setting.
	RUN	Run key	Press it to run the VFD when using the keypad for control.
	STOP RST	Stop/ Reset key	Press it to stop the VFD that is running. The function of this key is restricted by P07.04. In fault alarm state, this key can be used for reset in any control modes.
	QUICK JOG	Multifunction shortcut key	The function of this key is determined by the ones place of P07.02. 0: No function 1: Jog 2: Shift key to switch the display state 3: Switch between forward and reverse rotating 4: Clear the UP/DOWN setting 5: Coast to stop 6: Switch command channels in sequence 7: Quick debugging

Table 5-2 LCD keypad introduction

Name	Description		
Status indicator	RUN		Run indicator. Off: The VFD is stopped. Blinking: The VFD is in parameter autotuning. On: The VFD is running.
	TRIP		Fault indicator. LED on: The VFD is in fault state. LED off: The VFD is in normal state. LED blinking: The VFD is in pre-alarm state.
	QUICK/JOG		Short-cut key indicator, which displays different state under different functions, see definition of QUICK/JOG key for details.
Keys		Function key	The function of the function key varies with the menu. The function of the function key is displayed in the footer.
	QUICK JOG	Short-cut key	Re-definable. It is defined as JOG function by default, namely jogging. The function of short-cut key can be set by the ones place of P07.02
	Enter	Confirmation key	The function of confirmation key varies with menus, such as confirming parameter setup, confirming parameter selection, and entering the next menu.
	RUN	Run key	Under keypad operation mode, the running key is used for running operation or autotuning operation.
	STOP RST	Stop/ Reset key	Press it to stop the VFD that is running or autotuning. The function of this key is restricted by P07.04. In fault alarm state, this key can be used for reset in any control modes.
		Direction key UP: DOWN: Left: Right:	The function varies with the Interface： Up: such as shifting up the displayed item, shifting up the selected item, and changing digits. DOWN: such as shifting down the displayed item, shifting down the selected item, changing digits. LEFT: such as switch over the monitoring interface, shifting the cursor leftward, exiting current menu and returning to previous menu. Right: such as switching the monitoring interface, shifting the cursor rightward, and entering the next-level menu.
Display area	LCD screen	Display panel	240×160 dot-matrix LCD; display three monitoring parameters or six sub-menu items simultaneously.
Other	RJ45 interface	RJ45 interface	Used to connect to the VFD
	Battery cover	Clock battery cover	Removes this cover when replacing or installing clock battery, and close the cover after battery is installed.
	USB terminal	Mini USB terminal	Mini USB terminal is used to connect to the USB flash drive through an adapter.

Note: LCD keypad is based on model and are partially unsupported.

6 Common function parameter setup

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

"○" 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.

(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 mode	0: SVC 0 1: SVC 1 2: Space voltage vector control mode 3: Closed-loop vector control mode	Model depended	◎
P00.01	Channel of running commands	0: Keypad 1: Terminal 2: Communication	0	○
P00.03	Max. output frequency	Setting range: P00.04–400.00Hz **Note:** Goodrive350 is P00.04–630.00Hz.	50.00Hz	◎
P00.04	Upper limit of running frequency	Setting range: P00.05–P00.03 (Max. output frequency)	50.00Hz	◎
P00.05	Lower limit of running frequency	Setting range: 0.00Hz–P00.04 (Upper limit of running frequency)	0.00Hz	◎
P00.06	Setting channel of A frequency command	0: Keypad 1: AI3 (Corresponding to the keypad potentiometer) 2: AI2（Corresponding to terminal AI) 3: AI3 4: High-speed pulse HDI 5: Simple PLC program 6: Multi-step speed running 7: PID control 8: Modbus communication	0	○
P00.07	Setting channel of B frequency command		2	○
P00.10	Frequency set 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		Model depended	○
P00.13	Running direction selection	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. Speed tracking restart	0	◎
P01.08	Stop mode	0: Decelerate to stop 1: Coast to stop	0	○
P01.09	Starting frequency of braking for stop	Setting range: 0.00Hz–P00.03 (Max. output frequency)	0.00Hz	○
P01.11	DC braking current for stop	Setting range: 0.0–100.0%	0.00%	○
P01.12	DC braking time for stop	Setting range: 0.00–50.00s	0.00s	○
P01.18	Terminal-based running command protection at power-on	0: The terminal-based running command is invalid at power-on 1: The terminal-based running command is valid at power-on	0	◎
P02.00	Type of motor 1	0: Asynchronous motor (AM) 1: Synchronous motor (SM)	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	1–36000rpm **Note**: Goodrive350 is 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	◎
P02.15	Rated power of SM 1	0.1–3000.0kW	Model depended	◎
P02.16	Rated frequency of SM 1	0.01Hz–P00.03 (Max. output frequency)	50.00Hz	◎
P02.17	Number of pole pairs of SM 1	1–128	2	◎
P02.18	Rated voltage of SM 1	0–1200V	Model depended	◎
P02.19	Rated current of SM 1	0.8–6000.0A	Model depended	◎
P02.23	Counter-emf of SM 1	0–10000	300	○

Function code	Name	Description	Default	Modify
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 1	0.0–200.0	20.0	○
P03.04	Speed-loop integral time 1	0.000–10.000s	0.200s	○
P03.09	Current-loop proportional coefficient P	0–65535	1000	○
P04.01	Torque boost of motor 1	Setting range: 0.0%: (automatic); 0.1% –10.0%	0	○
P04.09	V/F slip compensation gain of motor 1	0.0–200.0%	0.0%	○
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) 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)	1	◎
P05.02	Function of S2		4	◎
P05.03	Function of S3		7	◎
P05.04	Function of S4		0	◎
P05.37	AI2 lower limit	Setting range: 0.00V–P05.39 **Note:** Goodrive350 series is P05.29.	0.00V	○
P05.39	AI2 upper limit	Setting range: P05.37–10.00V **Note:** Goodrive350 series is P05.35.	10.00V	○
P06.01	Y1 output	0: Disable 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–P06.04	RO output		1	○
P06.14–P06.15	AO analog output	0: Running frequency 1: Set frequency 3: Rotational speed (relative to twice the motor rated synchronous 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	○ ○
P06.16	HDO high-speed pulse output		0	○
P06.17–P06.26	AO output upper and lower limit settings	For details such as function code description, AO output limit and percentage, please scan the e-manual platform QR code, consult the full 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 set to 0.	1	○
P14.01	Communication baud rate setting	0:1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps	4	○
P14.02	Data bit check setting	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	○

7 Common faults and solutions

The following lists common VFD faults, of which the possible causes and solutions are described briefly.

Fault code	Fault type	Possible cause	Solution
OUt1	Inverter unit U-phase Protection	ACC is too fast. IGBT module is damaged. Misoperation is caused by interference. Drive wires are poorly connected. To-ground short circuit occurred.	Increase ACC time. Replace the power unit. Check drive wires. Check whether there is strong interference surrounding the peripheral device.
OUt2	Inverter unit V-phase Protection		
OUt3	Inverter unit W-phase		

Fault code	Fault type	Possible cause	Solution
	Protection		
OV1	Overvoltage during ACC	Deceleration time is too short. Abnormal input voltage. Large energy feedback. Lack of braking units. Dynamic braking is disabled.	Check the input power. Check whether load DEC time is too short. Install dynamic brake components. Check the related function code settings.
OV2	Overvoltage during deceleration		
OV3	Overvoltage during constant speed running		
OC1	Overcurrent during ACC	ACC/DEC is too fast. The grid voltage is too low. The VFD power is too small. Load transient or exception occurred. To-ground short circuit or output phase loss occurred. Strong external interference sources existed. Overcurrent stalling protection disabled.	Increase ACC/DEC time. Check the input power. Select a VFD with larger power. Check whether the load is short circuited (to-ground short circuit or line-to-line short circuit) or the rotation is not smooth. Check the output wiring. Check whether there is strong interference. Check the related function code settings.
OC2	Overcurrent during DEC		
OC3	Overcurrent during constant speed running		
UV	Bus undervoltage fault	The voltage of the grid is too low. The overvoltage stall protection is not enabled.	Check the grid input power. Check the setting of related function codes.
OL1	Motor overload	Grid voltage is too low. Motor rated current is set incorrectly. Motor stall or load jumps violently.	Check the grid voltage. Reset the rated current of the motor. Check the load and adjust the torque boost.
OL2	VFD overload	ACC is too fast. The motor is restarted during rotating. Grid voltage is too low. Load is too large. Power is too small.	Increase ACC time. Avoid restart after stop. Check the grid voltage. Select a VFD with larger power. Select a proper motor.
SPI	Input side phase loss	Phase loss or violent fluctuation occurred on inputs R, S, and T.	Check the input power. Check the installation wiring.
SPO	Output side phase loss	Phase loss occurred to U, V, W output (or the three phases of motor is asymmetrical).	Check the output wiring. Check the motor and cable.
OH2	Inverter module overheat Fault	Air duct is blocked or fan is damaged; Ambient temperature is too high; Long-time overload running.	Ventilate the air duct or replace the fan. Lower the ambient temperature.
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 the wiring to enhance the anti-interference capacity.
dEU	Speed deviation fault	The load is too heavy or stalled.	Check the load to ensure it is proper, and increase the detection time. Check whether the control parameters are set properly.
STo	Mal-adjustment fault	SM control parameters are set incorrectly. Autotuned parameters are not accurate. The VFD is disconnected from the motor.	Check the load and ensure the load is normal. Check whether control parameters are set correctly. Increase the mal-adjustment detection time.

8 More information

Please contact us for any information about the products. It is necessary to provide the product model and serial number during consultation.

To obtain more information, you can:

1. Call our hotline: 400-700-9997.
2. Contact INVT local office.
3. Visit www.invt.com or scan the following QR code of INVT.
4. Scan the e-manual platform QR code or the e-manual platform QR code marked on the VFD housing, select the corresponding series to view the full manual online and support the retrieval function.

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