Yolico

YD3000N
使用说明书

真正的电流矢量控制通用变频器

型号:YD3□□□□ T4 N

400V： 1.5~630KW

请将此使用说明书交给最终用户手 ，并请妥善保存

用户手册

Yolico

CAUTION

- May cause injury or electric shock
  Please follow the instructions in the manual before installation or operation.
- Disconnect all power before opening front cover of unit. wait 5 minutes until DC BUS capacitors discharge.
- Use proper grounding techniques.

注　意

- 会有受伤,触电的危险
  安装、运行前,请务必阅读使用说明书。
  有触电的危险。
- 通电中及切断电源后5分钟内,请勿打开前盖。
- 请务必确认接好接地线。

- 感谢您选用由优利康电气有限公司生产的YD3000N系列高性能矢量控制变频器。
- 为了充分发挥变频器的功能,确保使用者的安全,请详细研读本操作说明书,并请将此说明书交到最终用户手中,妥善保存。
- 如有任何问题请及时与本公司代理商或本公司业务人员联络,我们将竭诚为您服务。
- 本说明书中的示图,是为了说明示例,可能与拿到的产品会有所不同。由于产品改进,也会有适当的改动。
-

与安全有关的符号说明

本手册根据与安全相关的内容,使用了下列符号。

打上安全符号及语句,叙述重要的内容,请一定要遵守。

⚠危险 **错误使用时,会引起危险情况,可能会导致人身伤亡。**

⚠注意 **错误使用时,会引起危险情况,可能会导致人身轻度或中度的伤害和设备损害。**

然而, ⚠注意 即使是注意的事项,由于情况的变化,也有可能导致重大事故。

重要 **虽然不属于[危险],[注意],但仍需要用户遵守的事项,在有关联的地方也注上了标记。**

安全注意事项

■ 拿到产品时确认

⚠ 注 意
• **受损的变频器及缺少零部件的变频器,切勿安装。** 有受伤的危险。

■ 安装

⚠ 注 意
• **搬运时,请托住机体底部。** 只拿住面板,主体落下压脚,有受伤的危险。 • **请安装在金属等不易燃烧的板上。** 有火灾的危险。 • **两台以上的变频器安装在同一控制柜内时,请设置冷却风扇,并进风空气温度保持在45℃以下。** 由于过热,会引起火灾及其它事故。

■ 接线

⚠ 危 险
• **接线前,请确认输入电源是否处于OFF状 。** 有触电和火灾的危险。 • **接线作业,请电气工程人员来进行。** 有触电和火灾的危险。 • **接地端子,请一定要接地。** (400V级:特别第3种接地) 有触电和火灾的危险。 • **非常停止回路接线结束后,请一定要检查一下动作是否有效** 有受伤的危险。(接线责任属于使用者) • **请勿直接触摸输出端子,变频器的输出线切勿与外壳连接。输出线切勿短路。** 有触电及引起短路的危险。

⚠ 危 险
• **请确认交流主回路电源的电压与变频器的额定电压是否一致。** 有受伤和火灾的危险。 • **请勿对变频器进行耐电压试验。** 会造成半导体元件等的损坏。 • **请按接线图连接制动电阻,制动电阻单元,制动单元。** 有火灾的危险。 • **请用指定力矩的螺丝刀紧固端子。** 有火灾的危险。 • **请勿将电源线接到输出U、V、W端子上。** 电压加在输出端子上,会导致变频器内部损坏。 • **切勿将进相电解电容及LC/RC噪声滤波器接入输出回路。** 这样的部品连接后,会导致变频器、部品的损坏。 • **请勿将电磁开关、电磁接触器接入输出回路。** 变频器在有负载的运行中,浪涌电流会引起变频器的过电流保护回路动作。

■ 运行条件(参数)的设定

⚠ 注 意

- **实行自学习时,请勿连接电机的负载(电机空载)**
  电机旋转,会有受伤,设备损坏的危险。另外,连接负载的状 ,不能正确设定电机参数。

■ 试运行

⚠ 危 险

- **确认了前外罩安装好了之后,再输入电源,通电中,请勿拆卸外罩。**
  有触电的危险。
- **选择了复位再试功能的变频器,请勿靠近机械设备。因为报警停止时会突然再动。**
  (请在机械设计方面,确保即便起动也要对人的安全性。)
- **紧急停止开关, 请另外准备(停止按钮只有在功能已经设定时有效)**
  有受伤危险。
- **确认了运行信号被切断了,方可报警复位。运行信号状 下进行报警复位的话,会有突然再起动。**
  有受伤的危险。

⚠ 注 意

- **散热风扇及制动电阻放电而升温请勿触摸。**
  有烧伤的危险。
- **运行前,请再一次确认电机及机械使用允许范围等事项。**
  有烧伤的危险。
- **有必要使用保持制动器的,请另行准备。**
  有烧伤的危险。
- **运行中,请勿检查信号。**
  会损坏设备。
- **请勿随意变更变频器的设定,本变频器在出厂时已经进行了适当的设定。**
  会引起设备的损坏,但是电压400V,输出18.5kW以上的变频器,请设定电源电压。

■ 保养、检查

⚠ 危 险

- **变频器的端子请小心切勿触摸,有的端子上有高电压,非常危险的。**
  有触电的危险。
- **通电前,务必安装好保护罩。还有,拆卸外罩时,请一定要断电源。**
  有触电的危险。
- **切断主回路电源,确认CHARGE表示灯熄后,才可以进行检查、保养。**
  电解电容上有残余电压的危险。
- **除指定人员外,请勿进行保养、检查、部品更换工作。**
  [作业前,摘下身上的金属物(手表、戒指等),作业过程中,请使用已经实施了绝缘对策的工具]
  有触电的危险。

⚠ 危 险

- **控制基板,安装了CMOSIC集成电路,使用时请十分注意。**
  用手指直接触摸,因静电感应会损坏基板。
- **通电中,请勿变更接线以及端子拆装。**
  有触电的危险。

■ 其他

⚠ 危 险

- **绝对禁止自行改造。**
  有触电、受伤的危险。

目　　录

第一章　概　要

1.1　概要说明和功能

1.1.1 YD3000N的种类

YD3000N的电压级别为400V。适用电机功率由1.5～630KW

表1.1 YD3000N的种类

电压级别	电机功率	输入功率（KVA）	YD3000系列
			型号
400V级	1.5	3.7	YD31P5T4 BN
	2.2	4.7	YD32P2T4 BN
	3.7	6.1	YD33P7T4 BN
	5.5	11	YD35P5T4 BN
	7.5	14	YD37P5T4 BN
	11	21	YD3011T4 BN
	15	26	YD3015T4 BN
	18.5	31	YD3018T4 BN
	22	37	YD3022T4 BN
	30	50	YD3030T4(B)N
	37	61	YD3037T4(B)N
	45	73	YD3045T4(B)N
	55	98	YD3055T4(B)N
	75	130	YD3075T4(B)N
	93	150	YD3093T4(B)N
	110	170	YD3110T4(B)N
	132	210	YD3130T4(B)N
	160	230	YD3160T4(B)N
	185	260	YD3185T4(B)N
	200	300	YD3200T4(B)N
	220	340	YD3220T4(B)N
	250	380	YD3250T4(B)N
	280	430	YD3280T4(B)N
	315	460	YD3315T4(B)N
	355	490	YD3355T4N
	400	519	YD3400T4N
	450	585	YD3450T4N
	500	650	YD3500T4N
	560	722	YD3560T4N
	630	780	YD3630T4N

1.1.2 控制方式的概要

YD3000N有以下4种控制方式

- 无PG矢量控制[出厂设定]
- 无PG V/f 控制

所谓PG即脉冲编码器。所谓矢量控制即使磁场与力矩互不干涉,按指令进行力矩控制的方式。本产品的电流矢量控制,是同时控制电机的一次电流及其相位,分别独立控制磁场电流和力矩电流因此实现了在极低速时的平滑运行和高力矩高精度的速度控制、力矩控制。矢量控制可与传统的V/f控制切换,在不知道矢量控制所必要的电机参数的场合,可用自学习功能自动地设定电机参数。各种控制模式,对如下的用途有效。

- 无PG矢量控制:全部可变速驱动。
- 无PG V/f控制:传统的变频器控制模式,用于多路驱动(1台变频器驱动多台电机)

各控制方式的控制特性如表1.2所示

表1.2控制方式的特性

	矢量控制	V/f控制
	无PG	无PG
速度控制范围	1:100	1:40
速度控制精度	±0.2%	±2~3%
起动力矩	1Hz时150%	3Hz时150%

1.1.3 功能

■ 自学习功能

自学习功能在矢量控制方式时有效。电机参数的设定非常困难时,用独特的自学习功能可以解决。变频器能自动设定电机铭牌值范围的电机参数。从通用电机到变频器专用电机都可以进行矢量控制运行,电机可最大限度地发挥作用。

用矢量控制方式运行时,请务必在运行前对电机单体实施自学习。

■ V/F曲线设定

V/F曲线设定只有在V/f控制时有效。可以根据用途选择预先设定的15种V/f曲线,也可设定任意的V/f曲线。

■ 频率指令的种类

频率指令有如下5种方法。

- 用数字式操作器设定指令
- (负电压时,反方向运转)用0~±10V的电压值设定指令
- 用4-20mA的电流值设定指令
- 用选择卡设定指令

用相应的参数来设定,用5种中的哪一种。

在变频器内部,最多可设定9个频率指令。从外部输入多段速指令时,最多可以9速运行。

■ PID控制

使用PID控制功能可实现简单的闭环控制。所谓闭环控制,是用传感器将检出值反馈回变频器,使变频器的输出频率(电机的转速)与指令目标一致的控制方式。

PID控制是根据传感器的检出内容,对如下的应用有效。

- 速度控制:使用脉冲发生器等速度传感器,不管负载的大小使速度一致,或与其它电机同步运行。
- 压力控制:将压力传感器的检出值作为反馈量。可控制压力一定。
- 流量控制:使用流量传感器。流量的控制精度较高。
- 温度控制:将温度传感器检出值反馈,使风扇调速从而控制温度。

■ **DWELL(暂停)功能**

加速减速途中,输出频率在一定时间内保持的功能。驱动起动负载很大的电机时也能不跳跃地加速减速

■ **低噪声设计**

输出回路采用晶体管IGBT(绝缘栅双极晶体管)和高载波频率正弦波PWM 方式,从而使电机发出的金属声大大减低。

■ **监视功能**

使用数字操作器可监视以下项目:
频率指令,输出频率,输出电流,电机速度,输出电压,主回路直流电压,输出功率,力矩指令,输入端子的状 ,输出端子的状 ,运行状 ,累计运行时间,软件编号,速度偏差量,PID反馈量,故障发生时状 ,故障记录等。也可监视多功能模拟量输出的各种数据。

■ **数字操作器可用2种语言显示(SPEC:F级)**

数字式操作器可用2种语言(中文、英语)。
参数设定及监视项目用中文显示,内容一目了然,容易理解。人机对话使高性能变频器容易被熟练 应用。变更参数,就可以改变显示语言。

■ **参数的阶层化与3种类的存取级别**

YD3000N 为了实现丰富的功能而拥有很多参数。
为了方便地参照设定这些参数,参数按功能群分类阶层化。
阶层是从上位"方式"→"参数块" →"功能" →"参数"(参数设定)的顺序排列参数的阶层与内容如表所示。

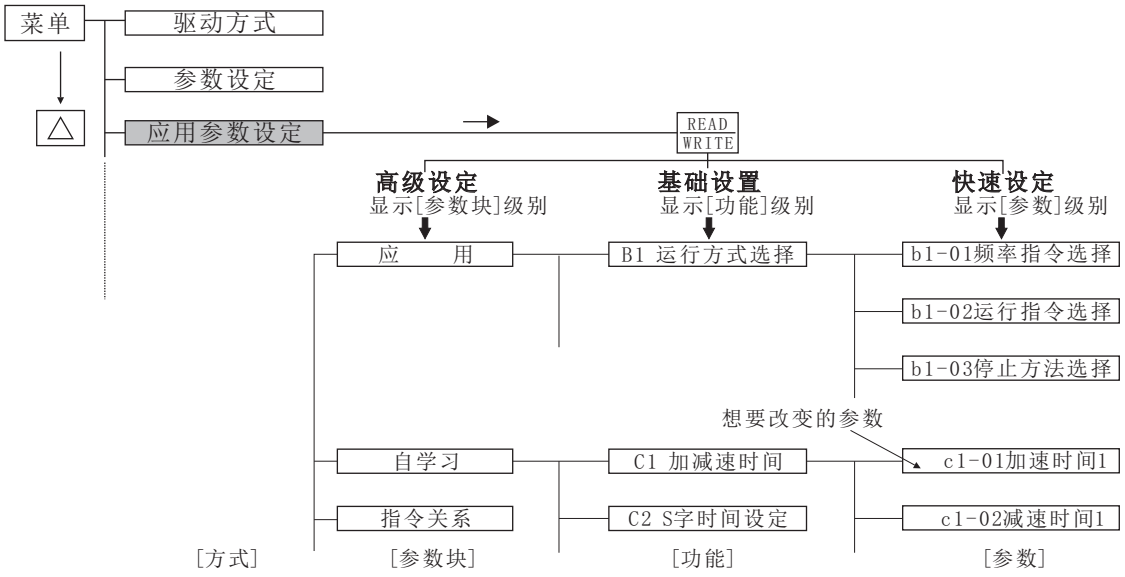
参数的阶层

阶层的名称	内 容
方 式	对应作用内容分类 驱动方式:变频器运行方式。 环境设定方式:选择操作器显示语种,设定存取级别,初始化,选择控制方式。 自学习方式:自动计算,设定电机参数(仅矢量控制时) 程序方式:为了运行而设定参数。 检验方式:由出厂设定变更而来的参数。
参数块	按用途分类
功能	按功能分类(参数读取)
参数	各个的参数设定

为了更简单地设定参数,YD3000N 可设定如下3种类存取级。所谓存取级即是可查看设定参数的范围。

快速设定	为了试运行而进行的必要的参数设定(出厂设定)
基础设定	进行一般性使用参数的设定
高级设定	进行全部的参数的设定

从某一阶层向其下位阶层移位时,请按READ /WRITE键,存取级别不同移位的阶层也不同。这样可设定的参数较少时,移向(快速设定)参数级别,可设定参数较多时,移向(高级设定)级别,这样操作简单了。

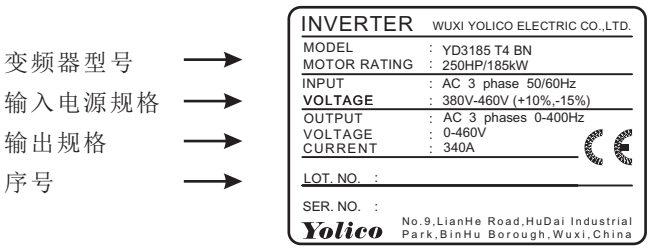

菜单
驱动方式
参数设定
△
应用参数设定
READ
WRITE
高级设定
显示[参数块]级别
基础设置
显示[功能]级别
快速设定
显示[参数]级别
应　　用
B1 运行方式选择
b1-01频率指令选择
b1-02运行指令选择
b1-03停止方法选择
想要改变的参数
自学习
C1 加减速时间
c1-01加速时间1
指令关系
C2 S字时间设定
c1-02减速时间1
[方式]
[参数块]
[功能]
[参数]

根据各存取级别分阶层

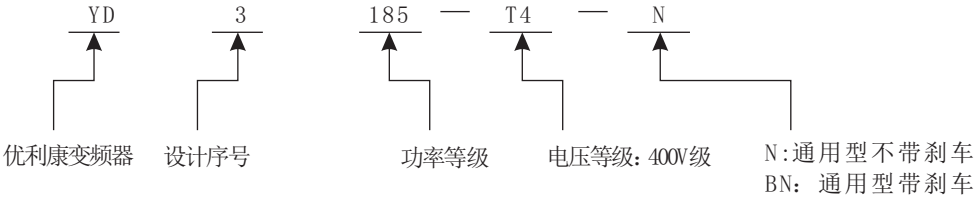
第二章　使用方法

2.1　铭牌

铭牌资料,以三相AC 400V　7.5KW系列



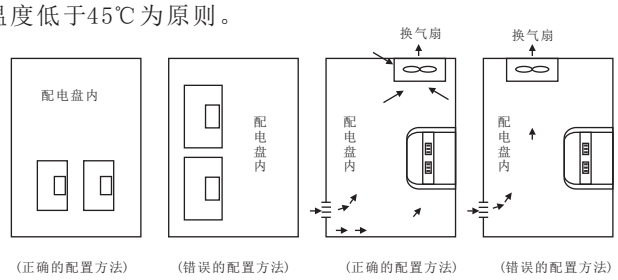
2.2　型号说明



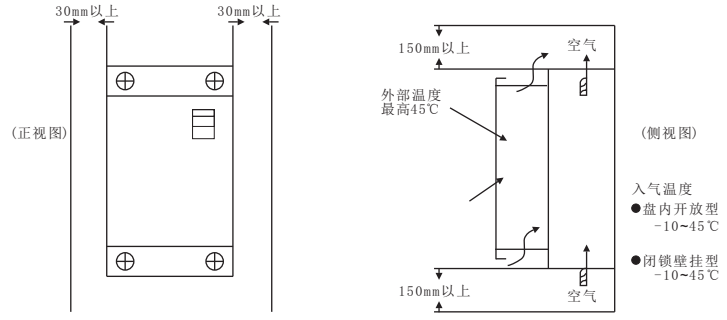
2.3　使用环境

变频器安装的环境对变频器正常功能的发挥及其使用寿命有直接的影响,因此变频 器的安装环境必需符合下列条件。

- 周围温度:盘内开放型(-10~45℃/+14~113℉)
  闭锁壁挂型(-10~40℃/+14~104℉)
- 防止雨水滴淋或潮湿环境
- 避免直接日晒
- 防止油雾,盐份侵蚀
- 防止腐蚀性液体,瓦斯
- 防止粉尘,棉絮及金属粉屑进入
- 远离放射性物质及可燃物
- 防止电磁干扰(焊接机,动力机器)
- 防止震动(冲床),若无法避免请加装防震垫片减少震动。
- 数台变频器安装于控制柜内时,请注意摆放位置以利散热,另请配置散热风扇,以使变频器周围温度低于45℃为原则。



- 安装时请将变频器正面朝前,顶部朝上以利散热。
- 安装空间必须符合下列规定:若安装于盘内或周围环境许可时可取下变频器之防尘上盖以利变频器散热通风。

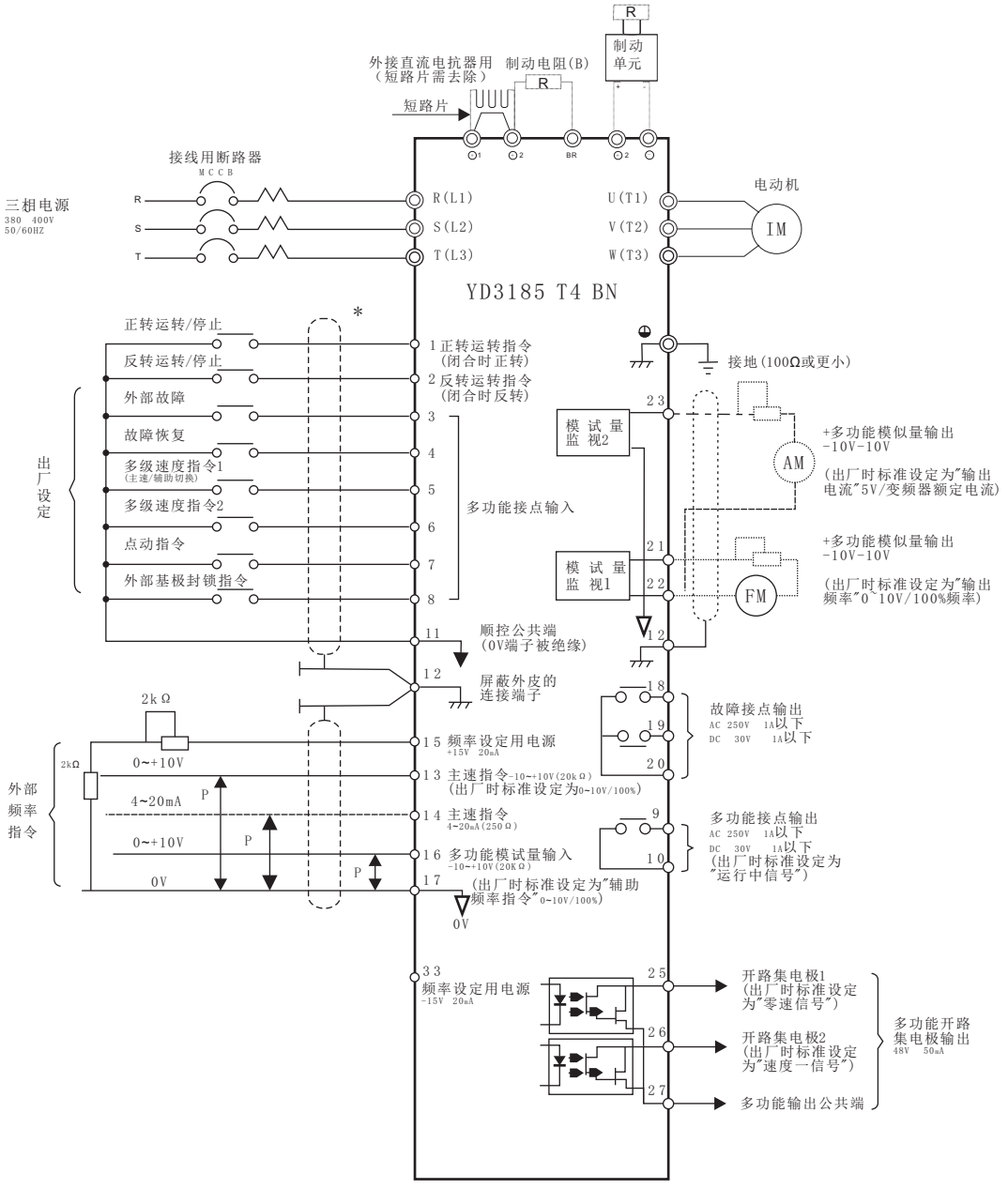


第三章　　接　线

3.1　连接图

YD3000N的接线，请按照图进行。

使用数字操作器时，仅连接上主回路就能运转电动机



连接图(以YD3185 T4 BN 为例)

1. 控制回路端子1~33的排列不是按顺序的。请参照下图,正确接线。

11	12(G)	13	14	15	16	17	25	26	27	33
1	2	3	4	5	6	7	8	21	22	23

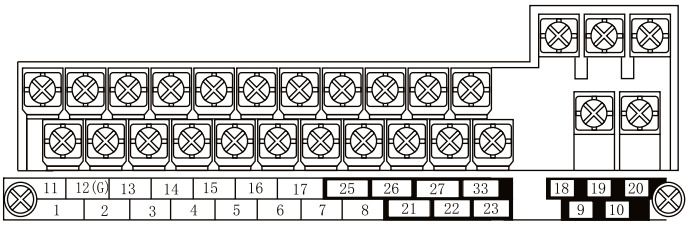
18	19	20
9	10	

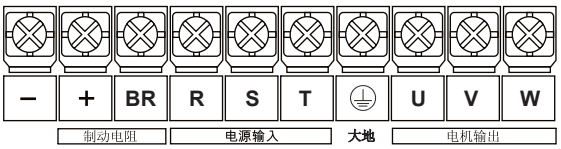
重要

2. 控制回路端子13和14,请勿同时使用。(同时输入的场合,这两个信号在变频器内部作加算处理)
3. 控制回路端子15,33(+15V,-15)的最大输出电流为20mA。
4. 多功能模拟量输出是频率表,电流表等指针式表专用输出。
   不能用于反馈控制等控制系统。使用在控制系统场合,推荐使用选件模拟量卡(AO-08或AO-12)。
5. 使用制动功能时,变频器参数中的"减速中失速防止"功能选项,请变更设定为"无效"(L3-04=0)。
   如果不改变设定,有时会在已设定的减速时间内不能停止。
6. 使用变频器安装型(ERF型)的制动电阻时,变频器参数中的变频器制动电阻保护选择,请变更设定为"有效"(L8-01)。如果不改变设定,则不能起到制动电阻的保护作用。
7. 使用改善功率因数的输入直流电抗器.只有与15kW以下的变频器连接时.可以用选择方式连接。
   连接时,请拆除 ⊕1与⊕2间的短路片。
8. 55~93kW的变频器,由于没有直流电源输入用端子,因此,不能与直流电源接线。

3.2 端子台的构成

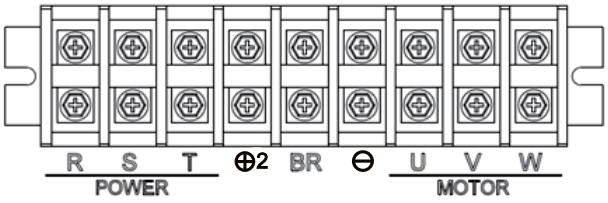
400V级1.5KW~315KW的变频器的端子排列如下所示





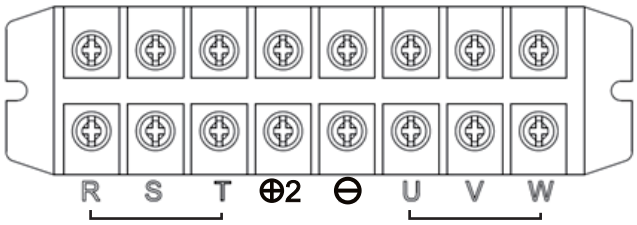
YD31P5 T4 BN
YD32P2 T4 BN
YD33P7 T4 BN
YD35P5 T4 BN
YD37P5 T4 BN
YD3011 T4 BN
YD3015 T4 BN
YD3018P5 T4 BN
YD3022 T4 BN

(塑料外壳)

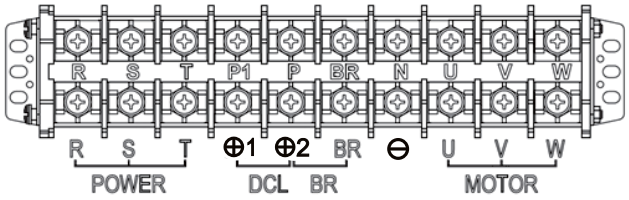


F4:YD3018 T4 BN
YD3022 T4 BN
(金属外壳) *旧款

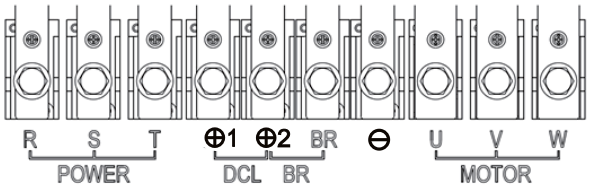
由于设计变更,以上端子接线与实物均可能有差异,按实物为准



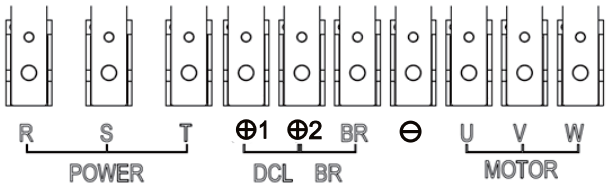
F4:YD3030 T4 N



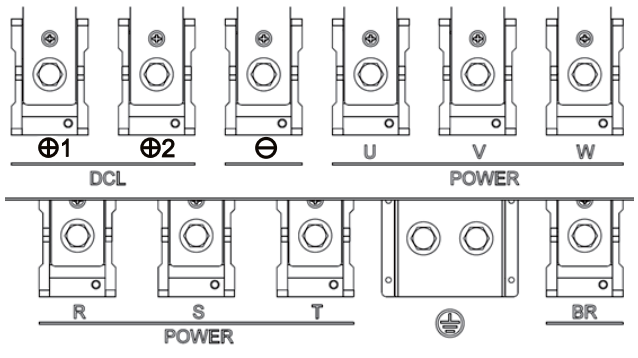
F5:YD3030 T4 BN
YD3037 T4 BN
YD3045 T4 BN
YD3055 T4 BN



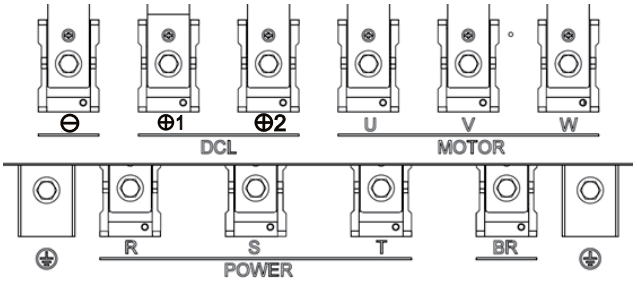
F6:YD3075 T4 BN
YD3093 T4 BN
YD3110 T4 BN



F7:YD3132 T4 BN
YD3160 T4 BN



F8:YD3185 T4 BN
YD3200 T4 BN
YD3220 T4 BN
YD3250 T4 BN



F9:YD3280 T4 BN
YD3315 T4 BN

＊R.S.T 输入电源　＊DCL 直流电抗器（不使用情况下短路片连接）
＊U.V.W 输出电执　＊BR(B) 刹车电阻.另一端连接 ⊕2

由于设计变更,以上端子接线与实物均可能有差异,按实物为准

3.3 主回路的接线方法

这里提示关于主回路输入输出的接线和接地线的连线.

■ 主回路输入侧的接线

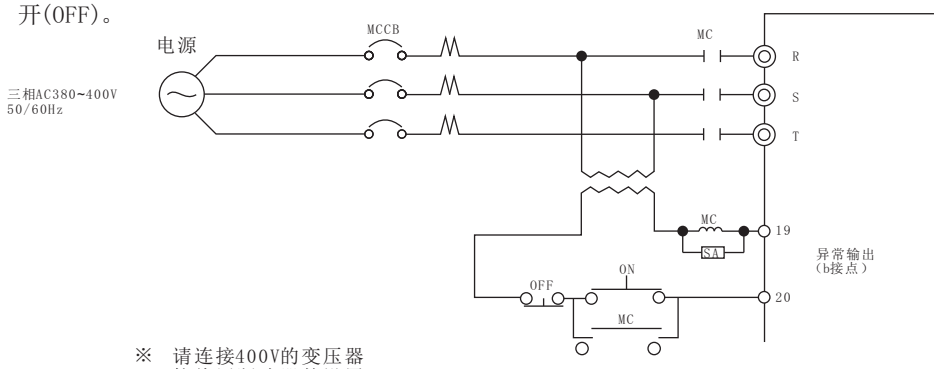
接线用断路器的安装

在电源和输入端子之间,请务必接入适合变频器功率的断路器(MCCB)

MCCB的容量请选用为变频器额定电流的1.5~2倍.

MCCB的时间特性要充分考虑变频器的过热保护(额定输出电流的120%,1分钟)的时间特性。

MCCB与两台以上变频器共用时及与 他设备共用时,如图7所示利用故障输出接点,使接触器将电源断开(OFF)。



※ 请连接400V的变压器
接线用断路器的设置

■ 漏电断路器的安装

变频器的输出是通过高速开关,因此会有高频漏电流发生。在变频器的进线侧使用变频器专用漏 电断路器,可以去除高频漏电流，并只检出对人体有危险的高频带的漏电流。请选用变频器专用漏电断路器。

- 用变频器专用的漏电断路器时,请选用控制每台变频器的感应电流为30mA以上的。
- 用一般漏电断路器时,请选用控制每台变频器的感应电流为200mA以上动作时间 0.1秒以上的。

■ 电磁接触器的设置

用顺序控制可以断开主回路电源时则电磁接触器(MC)可以替代断路器(MCCB)。但是进线侧电磁接触器强制让变频器停止时,则再生制动不动作,电机自由滑行 停止。

- 开/闭进线侧电磁接触器可以使变频器运行/停止,但频繁地开/闭将引起变频器故障。
- 用数字操作器运行时,停电复位后不能自动运行。使用制动单元时,请利用该单元的热敏继电器触点,将电源侧的电磁接触器断开。

■ 与端子排的接线

输入电源的相序与端子排的相序R.S.T没有关系,与哪一个端子都可以连接。

■ AC电抗器或DC电抗器的设置

连接大功率(600k VA以上)的电源变压器时,切换进相电解电容时,会有很大的 值电流输入本产品电源回路,从而有损坏整流部分元器件的可能。

这样的情况请在变频器的输入侧接入AC电抗器(可选项)。或者在DC电抗器端子上安装DC电抗器,也有改善电源侧功率因数的效果。

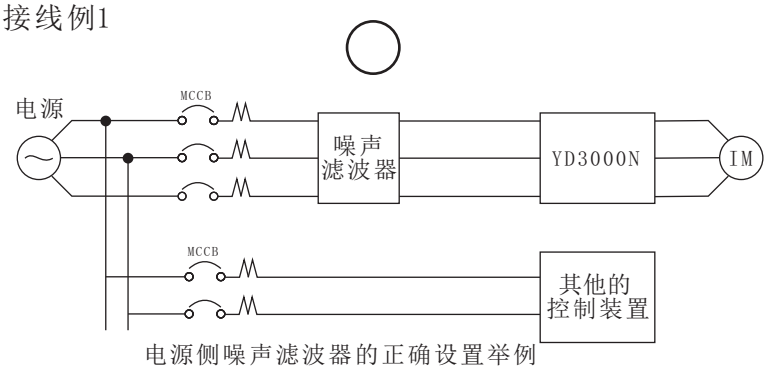
■ 浪涌抑制器的设置

在变频器的周边连接感性负载(电磁接触器,电磁继电器,电磁阀,电磁线圈,电磁断路器等)时,请务必使用浪涌抑制器或与二极管并联使用。

■ 电源侧噪声滤波器的设置

可以去除从电源线进入变频器的噪声,也可以减低从变频器向电源线的噪声。

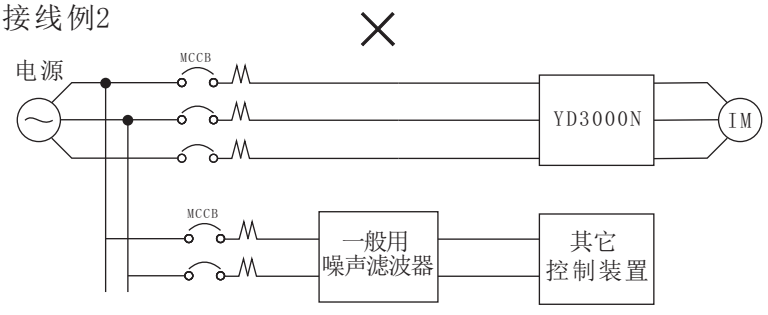
• 接线例1

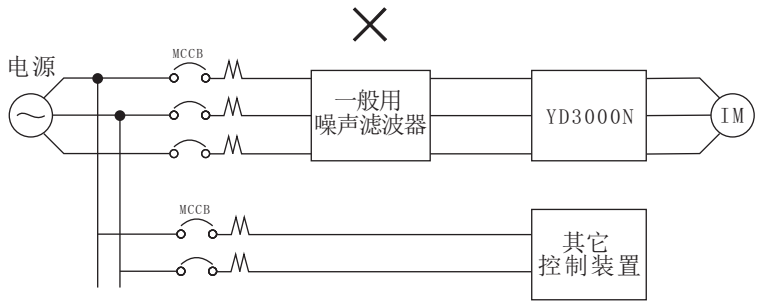


电源侧噪声滤波器的正确设置举例

请使用变频器专用噪声滤波器。

• 接线例2





电源侧噪声滤波器的不正确设置举例

变频器的噪声，用一般的噪声滤波器效果很小，故不能用。

■ 主回路输出侧的接线

变频器与电机的接线

输出端子U、V、W与电机的引出线U、V、W相连接。
运行时,请确认在正转指令下,电机是否正转。如果电机反转,则输出端子U、V、W的当中任选2根线对换即可。

绝对禁止将输入电源线接入输出端子

切勿将输入电源线连接至输出端子。在输出端子加上电压则会损坏变频器内部器件。

绝对禁止将输出端子短路和接地

切勿直接触摸输出端子,或输出线接触变频器外壳,有触电和短路的危险。此外,切勿将输出线短接。

绝对禁止使用相位超前的电解电容，噪声滤波器

切勿在输出回路连接相位超前的电解电容LC/RC,噪声滤波器。这类器件的连接,会使变频器损坏,部品烧坏。

绝对禁止使用电磁开关

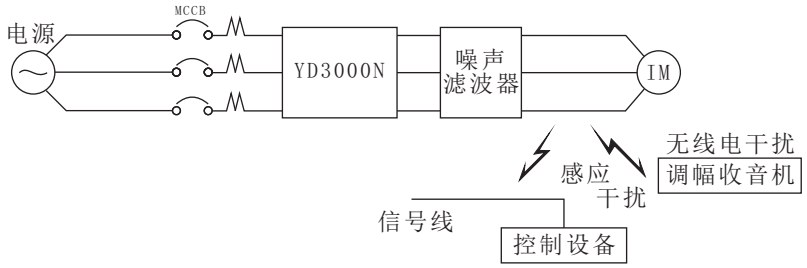
切勿在输出回路连接电磁开关、电磁接触器。变频器在运行中连接负载,变频器会由于浪涌电流而使过电流保护回路动作。

热敏继电器的安装

为了防止电机过热而发生事故,变频器有电子热保护功能。1台变频器驱动两台以上电机或多极电机使用时,请在变频器和电机之间设置热敏继电器(THR)并在参数L1-01(电机保护功能选择)选择为"0"(电机保护无效)。热敏继电器在50Hz时,请设定为电机额定电流的1.0倍。在60Hz时,请设定为1.1倍。并利用热敏继电器的接点,使主回路侧的电磁接触器断开(OFF)

输出侧噪声滤波器的安装

在变频器的输出侧连接噪声滤波器,可降低无线电干扰和感应干扰。



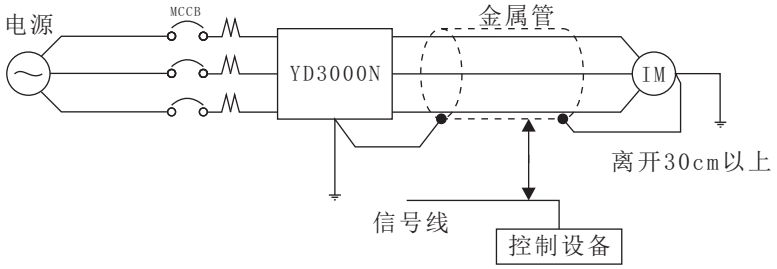
输出侧噪声滤波器的设置

感应干扰:电磁感应使信号线有噪声信号而导致控制设备误动作。

无线电干扰:变频器本身及电缆发射的高频电磁波,使收音机在收听过程中发出噪音。

感应干扰对策

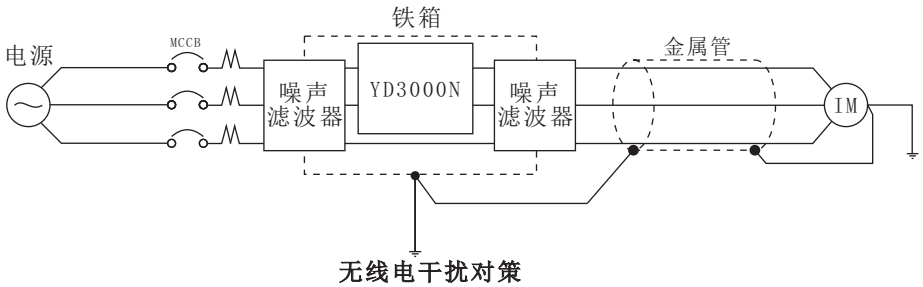
抑制输出侧发生的感应干扰方法,除了前面叙述的设置噪声滤波器之外,还有将输出接线全部穿入接地金属管内的方法。且与信号线距离30cm以上,感应干扰的影响明显减小。



感应噪声对策

无线电干扰

无线电干扰在输入输出线及变频器本身都会产生,在输入侧和输出侧都设置噪声滤波器,并全部都用铁箱屏蔽的话,则可以降低无线电干扰。另外,变频器和电机之间的接线距离尽量要短。



无线电干扰对策

■ 变频器与电机间的接线距离

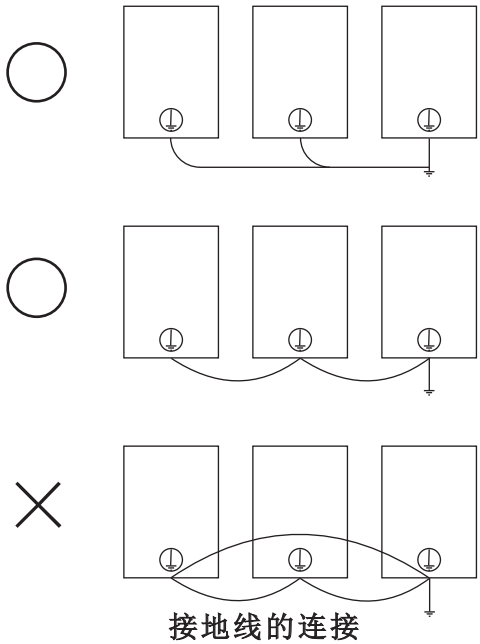
变频器与电机间的接线距离较长的场合,来自电缆的高谐波漏电流,会对变频器和周边设备产生不利影响。请参考表中调整载波频率(C6-01~03)参数。

变频器与电机的接线距离

变频器、电机间的接线距离	50m以下	100m以下	100m以上
载波频率	15k Hz以下	10k Hz以下	5k Hz以下
(C6-01设定值)	(15.0)	(10.0)	(5.0)
(C6-02设定值)	(15.0)	(10.0)	(5.0)
(C6-03设定值)	(0)	(0)	(0)

■ 接地线的设置

- **接地端子 ⏚ ,请务必接地**
  特别第3种接地(接地电阻10Ω以下)
- 接地线,切勿与焊接机及动力设备共用。
- 接地线,请按照电气设备技术标准所规定规格,在可能范围尽量短。由于变频器产生漏电流,与接地点距离太远则接地端子的电位将不稳定。
- 两台以上变频器使用场合,请勿将接地线形成回路。

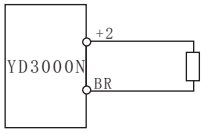


接地线的连接

■ 制动电阻器的连接(本体安装ERF型)

制动电阻器,请按下图那样连接。使用制动电阻,请务必进行如下认定。

L8-01(制动电阻器的过热保护选择)	"1" (过热保护有效)
L3-04(减速中失速防止选择) (请任意设定一个)	"0" (失速防止功能无效)
	"3" (带制动电阻防止失速功能有效)



制动电阻器

+2、BR是连接制动电阻的端子,请勿接到除此以外的端子。电阻器会异常发热而烧坏。

制动电阻的连接

YD31P5~YD3022 标准内置制动单元
YD3030~YD3315 选配可带制动单元

■ 制动电阻器单元(LKEB型)/制动单元(CDBR型)的连接

制动电阻器单元及制动单元请按下图那样连接,使用制动电阻场合,请进行如下设定

L8-01(制动电阻器的过热保护选择)	″0″ （过热保护有效）
L3-04(减速中失速防止选择) (请任意设定一个)	″0″ （失速防止功能无效）
	″3″ （带制动电阻防止失速功能有效）

L8-01,是连接ERF型制动电阻器时的参数。

L3-04为″1″ 设定(失速防止功能有效)时,若不使用制动电阻器单元的话,则减速时间不会短缩。

为了对单元进行过热保护,使用如图所示将单元的热敏触点连接,使电源侧断路。

制动单元配置说明：

1.5~22KW标配内置制动单元

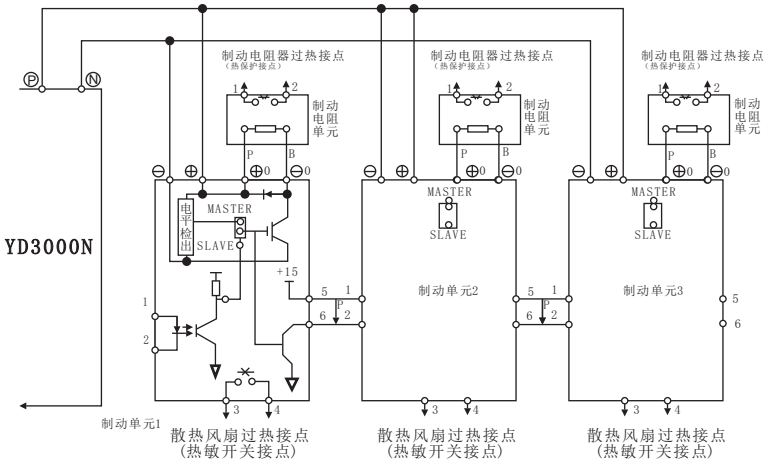
30KW及以上可以选配内置制动单元(参考主回路接线端子图)

制动电阻单元/制动单元的连接

制动单元的并联连接

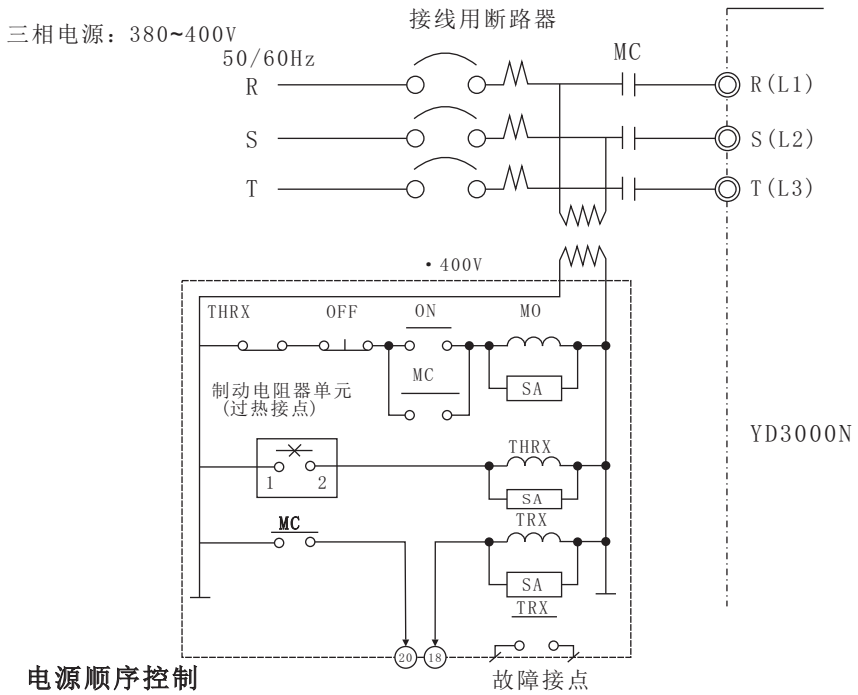
两台以上制动单元并联使用场合,请按下图那样接线,选择开关。

在制动单元上,有供选择的主/从开关器。仅用1台制动单元时,选择MASTER侧,其它的单元(制动单元2)选择在SLAVE侧。



制动单元的并联连接

电源顺序控制



电源顺序控制

3.4 控制回路端子的接线

为了不让控制用信号线受噪声影响,线长度请限制在50m以下,并与动力线分离走线。从外部输入频率指令的场合,请使用双绞屏蔽线。

3.4.1 使用与电线尺寸相适应的压线端子

端子编号与电线尺寸的关系如下表所示。

端子编号和电线尺寸(全机种通用)

端子编号	端子螺钉	电线电径(mm^2)	电线的种类
1~11,13~33	M3.5	软线0.5~1.25 硬线0.5~1.25	●双股屏蔽线
12 (G)	M3.5	0.5~2	

与电线尺寸相合适的圆形压线端子的尺寸及螺钉紧固力矩的关系如下表所示。

圆形压线端子的尺寸和螺钉紧固力矩

电线线径(mm^2)	端子螺钉	圆形压线端子的尺寸	螺钉紧固力矩(N·m)
0.5	M3.5	1.25~3.5	0.8
0.75		1.25~3.5	
1.25		1.25~3.5	
2		2~3.5	

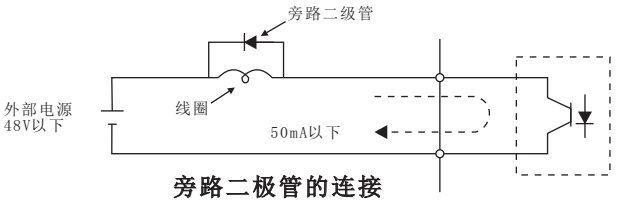
3.4.2 控制回路端子的功能

控制回路的端子按种类索引,其功能如下表所示,请对应用途适当的端子。

控制回路端子的一览表

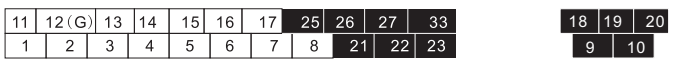
种类	端子记号	信号名	端子功能说明		信号电平
顺控器输入信号	1	正转运行-停止指令	"闭"正转"开"停止		DC+24V/8mA 绝缘光电耦合器
	2	反转运行-停止指令	"闭"反转"开"停止		
	3	外部故障输入	"闭"故障"开"正常	多功能接点输入(根据H1-01~H1-06的设定,可选择指令信号)	
	4	异常复位	"闭"时复位		
	5	主速/辅助切换(多段速指令1)	"闭"辅助频率指令		
	6	多段速指令2	"闭"多段速设定2有效		
	7	点动指令	"闭"时点动运行		
	8	外部基极封锁	"闭"时变频器输出停止		
	11	顺控器控制输入公共端	—		
模拟量输入信号	15	+15V电源输出	模拟量指令用+15V电源		+15V (允许电流最大20mA)
	33	-15V电源输出	模拟量指令用-15V电源		-15V (允许电流最大20mA)
	13	主速频率指令	-10~+10V/-100%~+100% 0~+10V/100%		-10~+10V(20kΩ) 0~+10V(20kΩ)
	14		4~20mA/100%, -10~+10V/-100%~+100% 0~10V/100%		4~20mA(250kΩ)
	16	多功能模拟量输入	-10~+10V/-100%~+100% 0~+10V/100%	辅助模拟量输入(H3-05)	-10~+10V(20kΩ) 0~+10V(20kΩ)
	17	控制用公共端	—		—
	12	屏蔽线的屏蔽层,用端子	—		—
顺控器输出信号	9	运行中信号(1a接点)	运行"闭"	多功能输出	干接点接点容量 AC250V 1A以下 DC30V 1A以下
	10				
	25	零速检出	零速值(b2-01)以下时"闭"		
	26	速度一致检出	设定频率的±2 Hz以内时"闭"		开路集电极输出 +48V50mA以下
	27	开路集电极输出公共端	—		
	18	故障输出信号(1c接点)	故障时18-20之间"闭" 故障时19-20之间"开"		干接点接点容量 AC250V 1A以下 DC30V 1A以下
	19				
	20				
模拟量输出信号	21	频率表输出	0~+10V/100%频率	多功能模拟量监视1(H4-01,H4-02)	0~±10Vmax.±5% 2mA
	22	公共端	—		
	23	电流监视	5V变频器额定电流	多功能模拟量监视2(H4-04,H4-05)	

＊ 驱动继电器的线圈等感性负载场合,请务必如下图接入旁路二极管。



请选择额定电流大于回路电流的旁路二极管

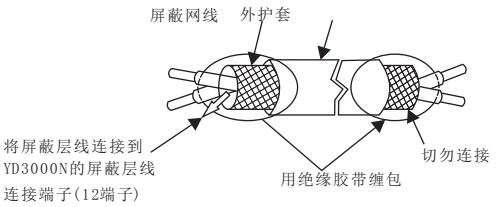
旁路二极管的连接



控制回路端子的排列

3.4.3 控制回路接线注意事项

- 把控制回路接线(端子1~33)与主回路线相关端子。
  及其它动力线或电源线分离走线。
- 把控制回路端子9,10,18,19,20(接点输出)与端子1~8,21,22,23,25,26,27,33,及11~17的接线分离走线。
- 为了防止干扰而引起的误动作,请使用绞合屏蔽线或双股屏蔽线。线的末端处理请参照图3.14,接线距离应小于50m。
  请将屏蔽层线连接到12(G)端子上。
- 切勿将屏蔽层线接触其它信号线及设备外壳,用绝缘胶带缠包起来。



双股屏蔽线的末端缠包

3.5 接线检查

接线完成后,请务必检查接线

- 接线是否有误。
- 线头,螺钉等有没有遗留在设备内。
- 螺钉是否有松动。
- 端子部分的裸导线是否与其它端子接触了。

第四章　运行参数的设定

4．1　数字操作的功能

加上了主回路电源后,数字操作器便显示出如图那样的初始显示,这里以显示初始值的状态为例介绍数字操作器的键名称和功能,如表所示。

数据表示部
显示监视数据,参数名及设定值
液晶16文字x2行

运行方式表示
DRIVE驱动方式时点亮
FWD:　正转指令输入时点亮
REV:　反转指令输入时点亮
SEQ:　从控制回路端子输入的运行指令有效时点亮
REF:　从控制回路端子13，14输入的频率指令有效时点亮

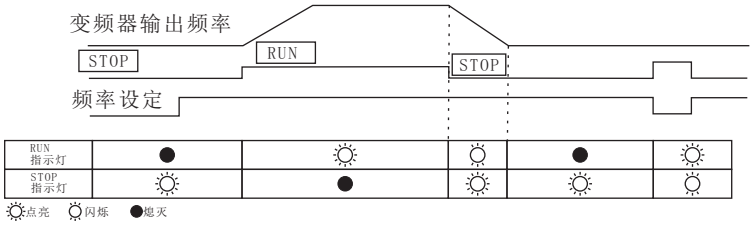
操作键
为了实际参数设定,监视JOG运行,自学习等而用的键。

数字操作器(操作器)的各部名称和功能

操作键的功能

键	文章中的名称	功能
LOCAL/REMOTE	LOCAL/REMOTE (运行方法选择)	切换用数字操作器控制运行(LOCAL)和控制回路端子控制运行(REMOTE)时,请按此键。
MENU	MENU (菜单)	表示各种方式
ESC	ESC (退回)	按ESC键,则回到前一个状态。
JOG	JOG (点动)	在操作器运行场合的点动运行键。
FWD/REV	FWD/REV (正转/反转)	在操作器运行场合,切换旋转方向键。
RESET	RESET (复位)	参数的数值设定时的数位选择键。 故障发生时作为故障复位键使用。
△	增加键	选择方式,组,功能,参数的名称,设定值(增加)等时请按此键。
▽	减少键	选择方式,组,功能,参数的名称,设定值(减少)等时请按此键。
READ/WRITE	READ/WRIT (数据输入)	决定各方式,功能,参数,设定值时,按下。
RUN	RUN (运行键)	用操作器运行时,按下此键变频器开始运行。
STOP	STOP (停止键)	用操作器运行时,按下此键,变频器便停止。 用控制回路端子运行的场合根据参数(o2-02)的设定可设定该键的有效/无效。

（注）版面编辑上,仅文章和表中不用实际键的形状表述。如上表那样。



RUN STOP指示灯,表示运行状态,对应运行状态有点亮,闪烁,熄灭。

4.2 方式的概要

4.2.1 方式的种类

由于YD3000N,它的各种参数,功能群(方式)的监视已参数块化,因此参数的查看,设定很简单。YD3000N 有五种方式,下表所示方式的种类及主要内容。

方式的种类和主要内容

方式名称	主要内容
监视模式	变频器运行可能的方式。 频率指令,输出电流等的监视,异常内容显示,异常记录显示等。
环境参数设定方式	操作器显示语种选择,参数的读取,设定级别(存取级别)的设定。 控制方式的选择,参数的初始化等。
应用参数设定	运行所必要的参数的读取,设定编程方式,按功能群有如下划分。 • 应用:选择运行方式,直流制动,速度搜索等。 • 调整:加减速时间,S字特性,载波频率等 • 指令关系:有关频率指令的设定 • 电机参数:V/f特性,电机参数 • 选项参数:关于选择卡的设定 • 外部端子功能:关于程序器(PLC)输入输出,模拟量输入输出的设定 • 操作器:操作器的表示功能,键功能的选择
自学习方式*	使用不知道电机参数的电机,且用矢量控制方式进行运行的场合,电机参数可自动地被计算并设定。
检验方式	进行与出厂设定不同参数读取设定。

* 用矢量控制方式运行,请务必在运行前对电机个体实施自学习。

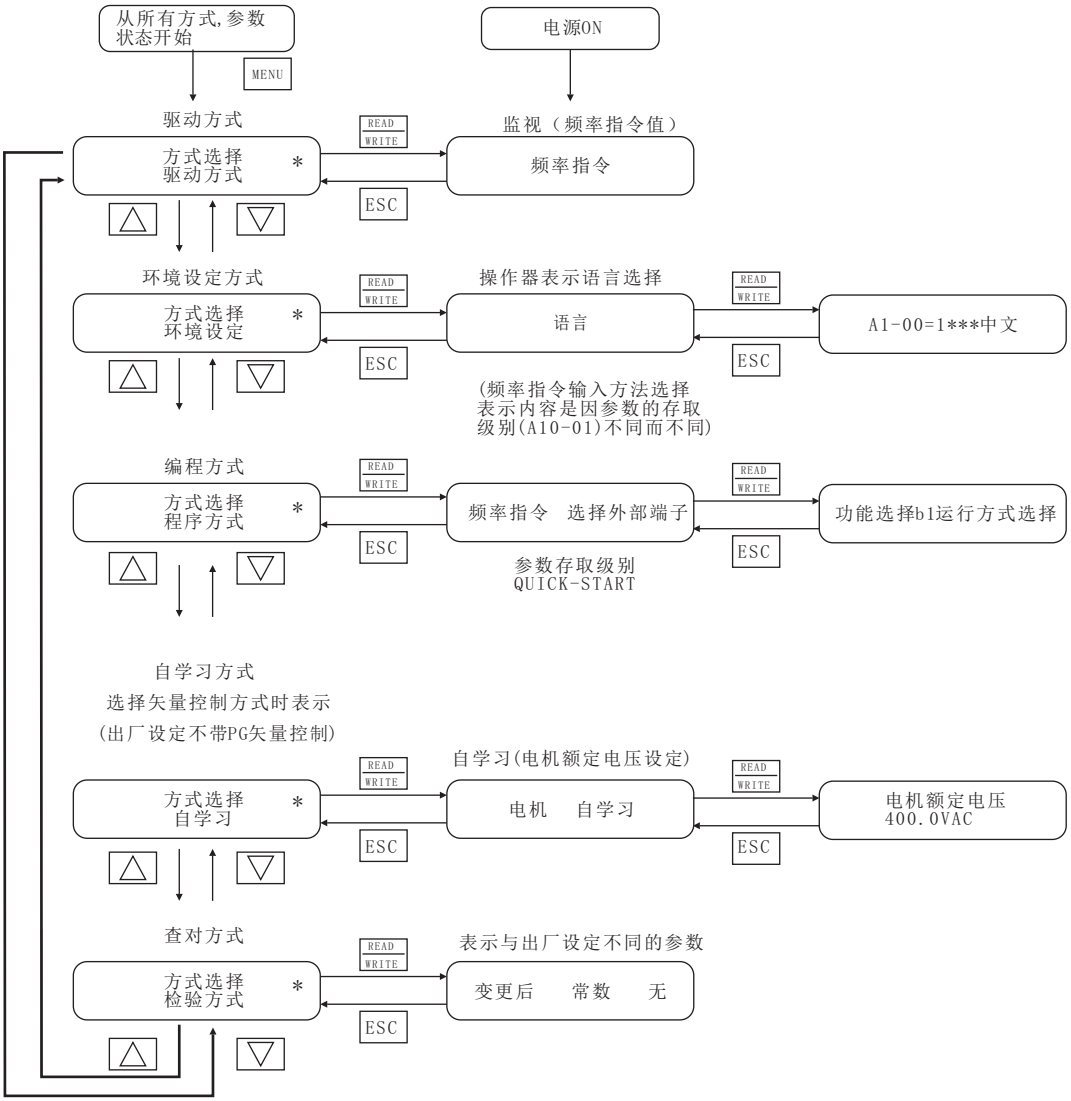
4.2.2 方式的切换

按[菜单]键,显示驱动方式,然后按[△]、[▽]键切换方式。读取・设定各方式中参数时,按[READ/WRITE]键。从参数的读取、设定状态返回方式各显示时,按[ESC]键。

按[READ/WRITE]键2次,显示出现[参数写入中],

然后,按[ESC],返回方式名显示。

此后,再按下ESC键,则回到方式名显示,这些是基本操作,务必请记住!



方式的表示　　功能的表示　　参数的表示
方式的切换　　(读取参数)　　(设定参数)

4.2.3 参数的存取级别

YD3000N,有以下3个存取级别,对应用途可以分开使用。

快速设定	可读取,设定简易运行所必要的参数(出厂设定)
基础设定	可读取,设定基本的参数
高级设定	可读取,设定全部参数。

根据存取级别可读取设定的参数有所不同,表示阶层也随之改变。
存取级别,可以在环境,设定方式的A1-01(参数的存取级别)中设定。

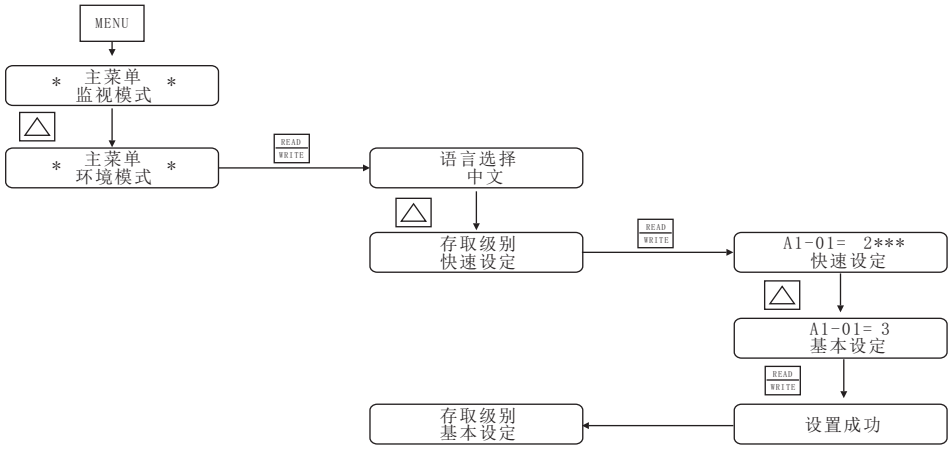
■ 从快速设定变更到基本设定的方法

现状是快速设定级别,通过以下的操作将快速设定变更到基本设定存取级别。

顺序	键	操作器的表示画面	说明
1	MENU	主菜单 * 监视模式	
2	△	主菜单 * 环境模式	
3	READ/WRITE	语言选择 中文	
4	△	存取级别 快速设定	
5	READ/WRITE	A1-01 2*** 快速设定	
6	△	A1-01=3 基本设定	
7	READ/WRITE	设置成功	
		存取级别 快速设定	约3秒后,操作器的显示画面如左图所示。

以上,从快速设定变更到了基本设定。

顺序的操作简单,如图所示。

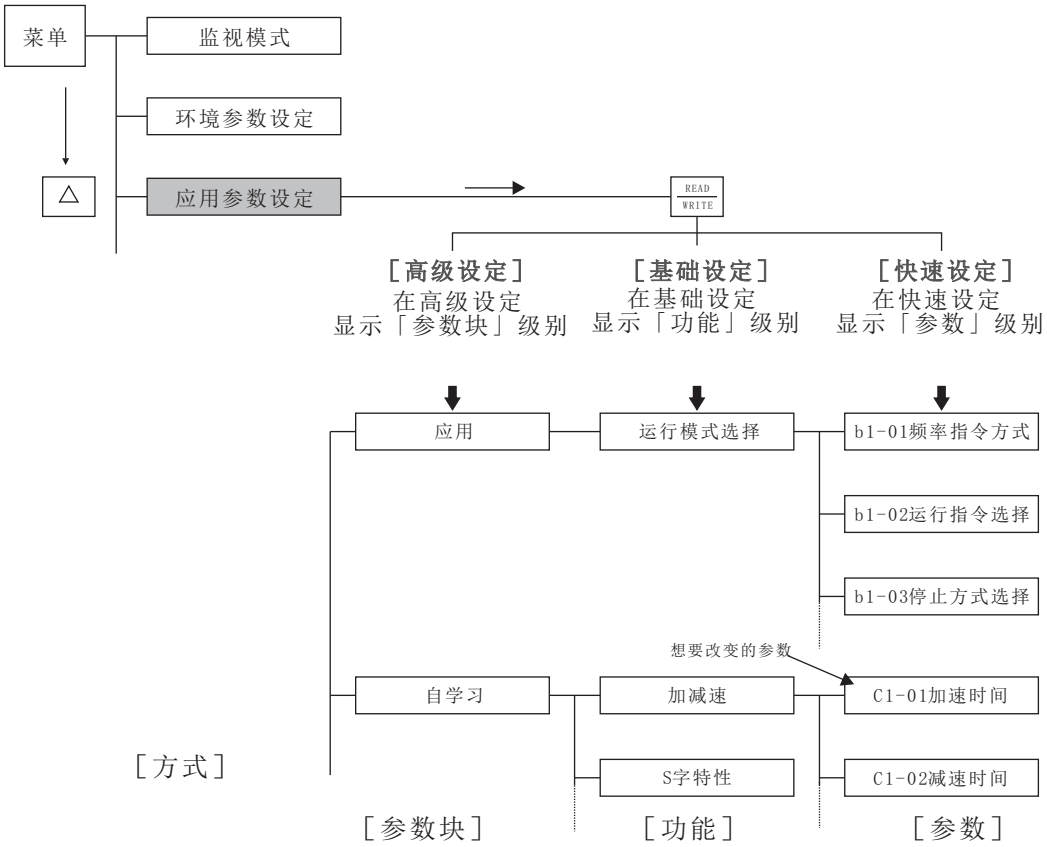


从快速设定变更到基本设定方法

■ 在各存取级别的参数设定

在此,以加速时间变更为20.0(s)为例的操作说明。

在参数设定当中,如果在1分钟内不按下READ/WRITE键,则显示回到前一个的设定值。这时,请从这个显示开始操作。



参数的阶层(一部分)

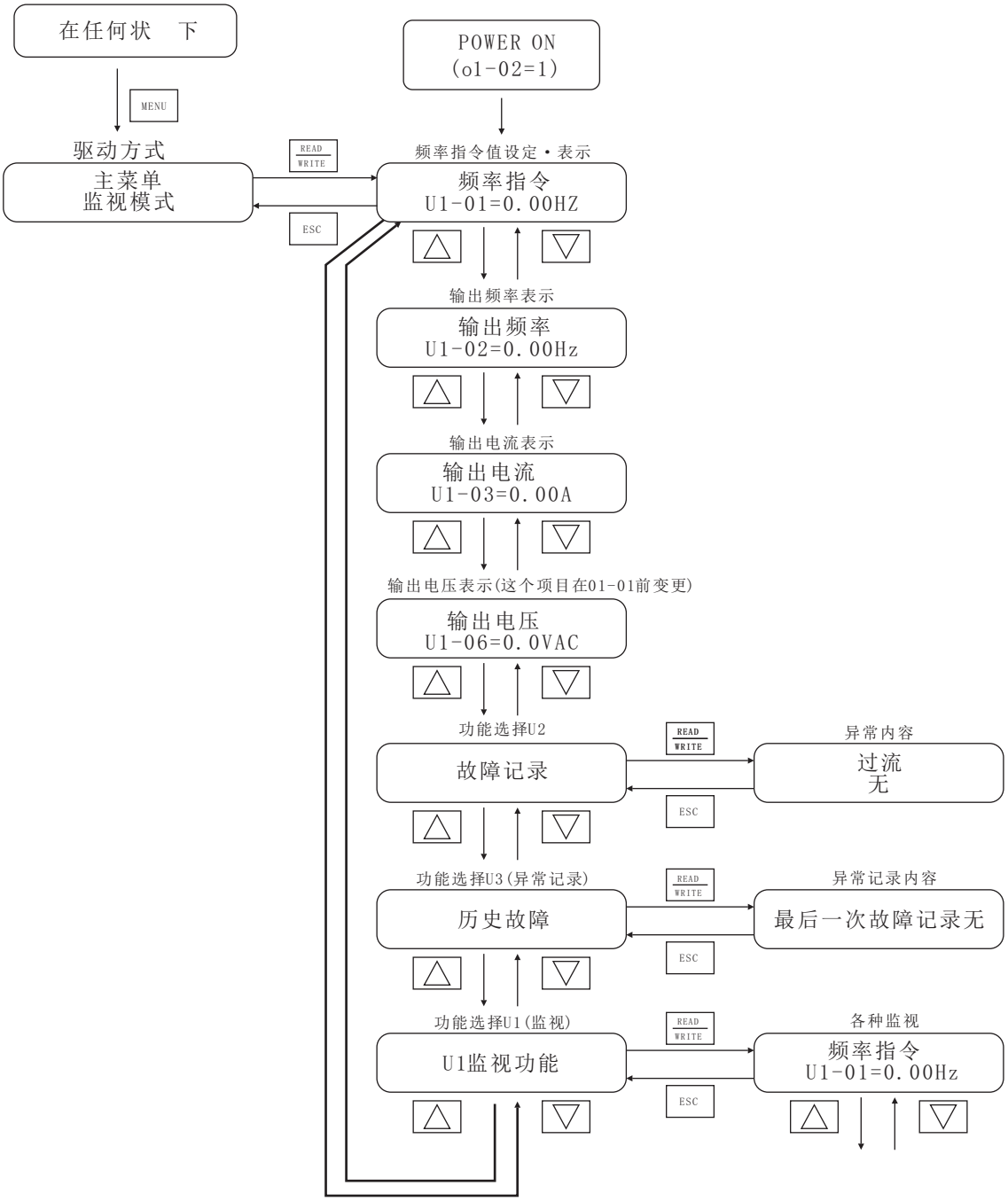
4.2.4 驱动方式

驱动方式是变频器运行方式。变频器在运行状态,可设定的参数受到限制。请参照监视参数一览表。在驱动方式,可监视频率指令,输出频率,输出电流,输出电压等及显示异常内容、异常记录等。

重要 变频器运行时,最初请按下MENU菜单键,并选择驱动方式状态。此时再按下READ/WRITE键选择状监视。
在此以外的显示状态,不接受运行指令。先进入一次状态监视,然后可以移向其它方式。

■ **在驱动方式的操作**

在驱动方式,键操作如图所示。(请转下一页)


在任何状 下
MENU
驱动方式
主菜单
监视模式
READ
WRITE
ESC
POWER ON
(o1-02=1)
频率指令值设定·表示
频率指令
U1-01=0.00HZ
输出频率表示
输出频率
U1-02=0.00Hz
输出电流表示
输出电流
U1-03=0.00A
输出电压表示(这个项目在01-01前变更)
输出电压
U1-06=0.0VAC
功能选择U2
故障记录
异常内容
过流
无
功能选择U3(异常记录)
历史故障
异常记录内容
最后一次故障记录无
功能选择U1(监视)
U1监视功能
各种监视
频率指令
U1-01=0.00Hz

在驱动方式的操作

■ 监视参数一览

在驱动方式,可监视的项目如表所示。

表中右边的[存取级别/表示可否]中,对在哪一个存取级别及控制方式可监视的项目作了记号,该记号的意思由以下表示。

Q	快速设定,基本设定,高级设定的全部存取级别,都可监视的项目
B	在高级设定和基本设定可监视的项目
A	仅在高级设定可监视的项目
X	在这种控制方式不可监视项目

另外,多功能模拟量输出时的信号级别,以增益=100.0　偏置=0.0表示

在驱动方式可监视的参数及其内容

功能	参数NO.	名称 操作器表示	内容	多功能模拟量输出时 输出信号级别	最小单位	存取级别			
						无PG V/f	有PG V/f	无PG 矢量	无PG 矢量
监视	U1-01	频率指令 Frequency Ref	频率指令值的监视/设定 表示单位nJ由01-03设定	10V:最高频率 (0~±10V 也能对应)	0.01Hz	Q	Q	Q	Q
	U1-02	输出频率 Output Freq	监视输出频率 表示单位用o1-03设定	10V:最高频率 (0~±10V 也能对应)	0.01Hz	Q	Q	Q	Q
	UP-03	输出电流 Output Current	监视输出电流	10V:变频器额定输出电流(0~±10V 的绝对值输出)	0.01A	Q	Q	Q	Q
	U1-04	控制方式 Control Method	确认设定的控制方式	(不可输出)	—	Q	Q	Q	Q
	U1-05	故障电机速度 Motor Speed	监视正在检出的电机速度 表示单位可由o1-03设定	10V:最高频率 (0~±10V 也能对应)	0.01Hz	X	X	Q	X
	U1-06	输出电压 Output Voltage	监视变频器内部的 输出电压指令值	10V:(AC400V) (0~+10V 输出)	0.1V	Q	Q	Q	Q
	U1-07	直流母线电压 DC Bus Voltage	监视变频器内部的 主回路直流电压	10V:DC(800V) (0~+10V 输出)	1V	Q	Q	Q	Q
	U1-08	输出功率 Output kWatts	监视输出功率 (内部检出值)	10V:变频器功率kW (最大适用电机功率) (0~±10V 也能对应)	0.1KW	Q	Q	Q	Q
	U1-09	力矩指令(内部) Torque Reference	矢量控制时，监视 内部力矩指令	10V:电机额定力矩 (0~±10V 也能对应)	0.1%	X	X	Q	Q
	U1-10	输入端子状 Input Tem Sts	监视输入端子的ON/OFF U1-10=00000000 1: 正转指令(端子1)为ON 1: 反转指令(端子2)为ON 1: 多功能输入1(端子3)为ON 1: 多功能输入2(端子4)为ON 1: 多功能输入3(端子5)为ON 1: 多功能输入4(端子6)为ON 1: 多功能输入5(端子7)为ON 1: 多功能输入6(端子8)为ON	(不可输出)	—	Q	Q	Q	Q
	U1-11	输出端子状态 Output Tem Sts	监视输出端子的ON/OFF U1-11=00000000 1:多功能接点输出(端子9-10)为ON 1:多功能输入1(端子25)为ON 1:多功能输入2(端子26)为ON 1:未使用(常时为0) 1:异常输出(端子18/19-20)为ON	(不可输出)	—	Q	Q	Q	Q

(接下一页)

功能	参数NO.	名称 操作器表示	内容	多功能模拟量输出时输出信号级别	最小单位	存取级别			
						无PG V/f	有PG V/f	无PG 矢量	有PG 矢量
状监视	U1-12	运行状 Int Ctl Sts I	变频器运行状 确认 U1-12=00000000 1:运行中 1:零速中 1:反转中 1:复位信号输入中 1:速度一致中 1:变频器运行准备完了 1:异常检出中(轻故障) 1:异常检出中(重故障)	(不可输出)	-	Q	Q	Q	Q
	U1-13	累计运行时间 Elapsed Time	监视变频器累计运行时间初始值运行时间/通电时间的选择可由02-07,-08设定	(不可输出)	1小时	Q	Q	Q	Q
	U1-14	软件编号No FLASH ID	(制造厂家管理用)	(不可输出)	—	Q	Q	Q	Q
	U1-15	频率指令(电压)端子13输入电压 Term 13Level	监视频率指令(电压)的输入电压10V输入时,表示100%	10V：100%(10V输入时) (0~±10V输出)	0.1%	B	B	B	B
	U1-16	频率指令(电流)端子14输入电流 Term 14 Level	监视频率指令(电流)的输入电流200mA输入时,表示100%	20mA：100%(20mA输入时) (0~+10V输出)	0.1%	B	B	B	B
	U1-17	多功能模拟量输入端子16输入电压 Term 16 Level	监视多功能模拟量输入的输入电压10V输入时,表示100%	10V：100%(10V输入时) (0~±10V也可对应)	0.1%	B	B	B	B
	U1-18	电机2次电流 Mot SEC Current	电机2次电流的演算值的监视监视额定电流时表示为100%	10V：电机额定2次电流 (0~+10V输出)	0.1%	B	B	B	B
	U1-19	电机励磁电流 Mot SEC Current	电机励磁电流的演算值的监视监视额定电流时表示为100%	10V：电机额定2次电流 (0~+10V输出)	0.1%	X	X	B	B
	U1-20	SFS输出 SFS Output	监视软起动后的输出频率表示的频率是未进行滑差补偿等补偿功能的状，表示单位根据01-03设定	10V：最高频率 (0~±10V也可对应)	0.1%	A	A	A	A
	U1-21	速度控制(ASR)的输入 ASR Input	监视向速度控制回路输入最高频率时,用100%表示	10V:最高频率 (0~±10V也可对应)	0.1%	X	A	X	A
	U1-22	速度控制(ASR)的输出 ASR Input	监视从速度控制回路的输出电机额定2次电流时,用100%表示	10V：电机额定2次电流 (0~±10V也可对应)	0.1%	X	A	X	A
	U1-23	速度偏差量 Speed Deviation	监视速度控制回路内的速度偏差最高频率时,用100%表示	10V:最高频率 (0~±10V也可对应)	0.1%	X	A	X	A
	U1-24	PID反馈量 PID Feedbacd	监视PID控制时的反馈量 当最高频率输入时,用100%表示	10V：最高频率 (0~±10V也可对应)	0.1%	A	A	A	A
	U1-25	DI-16 Reference DI-16 H2 input status	监视从D1-16 H2(数字指令)卡来的指令值 根据F3-01的设定,用二进制/BCD表示	(不可输出)	—	A	A	A	A
	U1-26	输出电压指令1(Vq) Voltage REF2(Vq)	对电机2次电流控制,监视变频器内部电压指令值	10V：(AC400V) (0~+10V也可对应)	0.1%	X	X	A	A
	U1-27	输出电压指令(Vd) Votage Ref(Vd)	对电机磁电流控制,监视变频器内部电压指令值	10V：(AC400V) (0~+10V也可对应)	0.1%	X	X	A	A

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驱动方式可监视的参数及其内容(续)

功能	参数NO.	名称 操作器表示	内容	多功能模拟量输出时输出信号级别	最小单位	存取级别			
						无PG V/f	有PG V/f	无PG 矢量	有PG 矢量
状监视	U1-28	CPU编号 CPU ID	(制造厂家管理用)	(不可输出)	0.1V	A	A	A	A
	U1-32	q轴的ACR输出 ACR (q) Output	监视对电机2次电流进行电流控制的输出值	10V:100%	0.1%	X	X	A	A
	U1-33	d轴的ACR输出 ACR (d) Output	监视对电机励磁电磁进行电流控制的输出值	10V:100%	0.1%	X	X	A	A
	U1-34	OPE异常 OPE Detected	显示OPE异常检出后,最初的参数编号NO.	(不可输出)	—	A	A	A	A
	U1-35	零伺服移动脉冲数 Zero servo pulse	零伺服中,以停止点为中心的移动幅用4倍PG的脉冲表示	(不可输出)	0.1%	X	X	X	A
	U1-36	PID 的输入量 PID Input	PID指令,+PID指令的偏置,-PID的反馈量.用最高频率/100%表示	10V:最高频率	0.01%	A	A	A	A
	U1-37	PID 的输出量 PID Output	PID 控制的输出用最高频率/100%表示	10V:最高频率	0.01%	A	A	A	A
	U1-38	PID指令 PID Setpoint	PID指令,+PID指令的偏置,用最高频率/100%表示	10V:最高频率	0.01%	A	A	A	A
(注)异常轨迹	U2-01	现在故障 Current Fault	现在发生中的异常内容		—	Q	Q	Q	Q
	U2-02	最后一次故障 Last Fault	最近发生的异常内容		—	Q	Q	Q	Q
	U2-03	频率指令 Frequency Ref	"过去的异常"发生时的频率指令		0.01Hz	Q	Q	Q	Q
	U2-04	输出频率 Output Freq	"过去的异常"发生时的输出频率		0.01Hz	Q	Q	Q	Q
	U2-05	输出电流 Output Current	"过去的异常"发生时的输出电流		0.1A	Q	Q	Q	Q
	U2-06	电机速度 Motor Speed	"过去的异常"发生时的电机速度		0.01Hz	X	Q	Q	Q
	U2-07	输出电压 Output Voltage	"过去的异常"发生时的输出电压指令	(不可输出)	0.1V	Q	Q	Q	Q
	U2-08	直流母线电压 DC Bus Voltage	"过去的异常"发生时的主回路直流电压		1V	Q	Q	Q	Q
	U2-09	输出功率 Output kWatts	"过去的异常"发生时的输出功率		0.1KW	Q	Q	Q	Q
	U2-10	DC Bus Voltage 力矩指令 Torque Reference	"过去的异常"发生时的力矩指令电机额定力矩时用100%表示		0.1%	X	X	Q	Q
	U2-11	输入端子状态 Input Term Sts	"过去的异常"发生时的输入端子状态与U1-10同样的状态表示		—	Q	Q	Q	Q

(注) CPF00,01,02,03,UV1,UV2异常发生时,不留下异常轨迹。

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功能	参数NO.	名称 操作器表示	内容	多功能模拟量输出时输出信号级别	最小单位	存取级别			
						无PG V/f	有PG V/f	无PG 矢量	有PG 矢量
(注)异常轨迹	U2-12	输出端子状 Outputterminal	"过去故障"发生时的输出端子状 与U1-11同样表示		—	Q	Q	Q	Q
	U2-13	运行状态 Output Term Sts	"过去故障"发生时的运转状 与U1-12同样表示	(不可输出)	—	Q	Q	Q	Q
	U2-14	异常累计时间 Elapsed Time	"过去故障"发生时的累计运行时间		1小时	Q	Q	Q	Q
(注)异常记录	U3-01	最后一次故障 Last Fault	1次前的异常内容		—	Q	Q	Q	Q
	U3-02	前第二次故障 Fault Message2	2次前的异常内容		—	Q	Q	Q	Q
	U3-03	前第三次故障 Fault Message3	3次前的异常内容		—	Q	Q	Q	Q
	U3-04	前第四次故障 Fault Message4	4次前的异常内容		—	Q	Q	Q	Q
	U3-05	1次累计时间 Elapsed Time1	"1次前的异常"发生时的累计运行时间	(不可输出)	1小时	Q	Q	Q	Q
	U3-06	2次累计时间 Elapsed Time2	"2次前的异常"发生时的累计运行时间		1小时	Q	Q	Q	Q
	U3-07	3次累计时间 Elapsed Time3	"3次前的异常"发生时的累计运行时间		1小时	Q	Q	Q	Q
	U3-08	4次累计时间 Elapsed Time4	"4次前的异常"发生时的累计运行时间		1小时	Q	Q	Q	Q

(注) 1. CPF00,01,02,03,UV1,UV2异常发生时,没有异常轨迹。
2. CPF00,01,02,03,UV1,UV2异常不留异常记录。

■ 电源ON时的监视

在驱动方式,可以监视出厂设定的频率指令,输出频率,输出电流,输出电压.只有输出电压可以和其它的监视项目置换。想要让显示输出电压以外的监视项目时,请01-01(选择驱动方式表示项目)设定监视编号.请参照后面叙述的操作举例。已设定了出厂值时,在电源ON时,在数据部分显示频率指令。电源ON时的监视项目可以从频率指令,输出频率,输出电流及由o1-01设定了的项目中选择.想要变更电源ON时的监视表示,请改变o1-02(电源ON时监视表示项目选择)。表示项目o1-01及o1-02参数,存取级别只有设定在基本设定和全部设定才能设定。

■ 监视表示的说明

在本手册用如下表对每个参数作说明

参数NO.	名称	运行中可改变	设定范围	单位	出厂时设定	存取级别	
						无PG V/f	无PG 矢量
o1-01	选择驱动方式表示项目	0	4~38	-	6	B	B

请设定想要表示的监视项目编号(监视参数一览表的"U1 □□"的□□部分数值)已设定的监视项目替代输出电压的表示显示。

运行中改变	可否在变频器运行中变更参数	
	0	运行中也可改变
	X	运行中不可改变
设定范围	参数的设定范围	
单位	设定值的单位("-")表示无单位	
出厂设定	出厂时设定值(对不同控制方式有不同的出厂设定值。若改变控制方式,新的设定值会替换出厂设定值)。	
PG V/f	用哪一种控制方式,可查看设定。在某一个存取级别可查看设定。	
	Q	在快速设定、基础设定、高级设定的全部存取级别都可查看设定的项目。
	B	在高级设定、基础设定可读取设定的项目。
	A	在高级设定,可读取设定的项目。
	X	在这个控制方式不能读取设定的项目。

参数NO.	名称	运行中可改变	设定范围	单位	出厂时设定	存取级别	
						无PG V/f	无PG 矢量
o1-02	选择电源ON的监视表示项目	0	1~4	—	1	B	B

请选择电源ON时想要显示的监视项目。请参照下表

电源ON时的监视表示项目的内容

设定值	内容
1	电源ON时,显示频率指令
2	电源ON时,显示输出频率
3	电源ON时,显示输出电流
4	电源ON时,显示由o1-01设定的监视项目

4.3 试运行的顺序

按照以下的流程,进行试运行

(转下一页)

项目	内容
设置 安装	按照设置条件,请设置好变频器 ・请确认是否满足了设置条件
接线	请与电源,周边设备接线 ・选择规格相合适的周边设备,并正确接线。
电源投入	实施了电源投入前的确认之后,请投入电源 ・请务必确认电源电压是否正确和电源输入端子(RST)是否已确实接线了。 400V级:三相AC380~460V 50/60Hz ・请确认电机输出端子是否确认已与电机连接好了。 ・请确认控制回路端子与控制装置是否确实连接好了,且控制回路端子全部在OFF位置。 ・使用PG速度控制卡的场合,请确认是否确实连接好了。 ・请让电机处在空载状 (不连接机械负载)。 ・确认了以上事项后,请投入电源。
表示状态的确认	请确认变频器是否异常 ・电源投入时,正常的话,有如下显示。 数据表示:[频率指令][FREQUENCY REF] ・发生异常时,在数据表示处异常内容被显示,此时,请参照第9章[异常诊断]并实施对策。
输入电压设定*1	请正确设定变频器的输入电压(E1-01)
电机选择	请正确设定电机过热保护(E1-02)
自学习*2	无PG矢量控制方式运行的场合,运行前,请实施对电机单体的自学习。 ・实行自学习,电机参数自动地被设定。 ・不进行自学习的场合,请用V/F控制方式,并设定V/F曲线。 电机的负载不能脱开的场合,可以通过计算设定电机的参数,详细事项请来咨询。
空载运行	请用数字操作器让空载的电机旋转。 ・用数字操作器设定频率指令,用键操作使电机旋转。
有负载运行	连接机械负载,用数字操作器运行。 ・空载运行没有问题时,给电机加上机械负载,请用操作器运行。
运行	基本运行(为了使变频器运行,停止所必要的基本设定下的运行) 应用运用(使用PID及其它功能的运行) ・只用基本参数进行运行的场合,请参照[基本运行]的项目。 ・使用直流制动,速度搜索,计时功能,S字加减功能滑差补偿,力矩补偿,暂停控制,零伺服,力矩控制等应用功能场合,请配合[基本运行],参数[应用运行]。

*1. 确认了显示状态后,有时需要参数初始化。

*2. 电机的负载不能脱开的场合,可以通过计算设定电机的参数,详细事项请来咨询。

参数的初始化	请将参数初始化 交换了备品控制基板场合,并确认了变频器容量(KVA)=02-04后,请实施参数的初始化。

4.3 试运行的操作

4.3.1 电源投入

■ **电源投入前的确认事项**

- 电源电压是否正确
  200V级:三相AC200~230V 50/60HZ
  400V级:三相AC380~460V 50/60HZ
- 电机的输出端子与电机的线确实接好了没有。
- 变频器的控制回路端子与其他控制装置的线确实接好了没有。
- 变频器的控制回路端子是否全部处在OFF位置。
- 使用PG速度控制卡的场合,是否确实连接好了。
- 电机是否处在空载状态(机械负载没有被连接状态)。

4.3.2 表示状态的确认

电源投入时,数字操作器的表示, 正常状态应该如下显示。

[正常时] 频率指令 U1-01=0.00Hz 在数据表示部显示对频率 指令的监视异常发生时,会显示与上面一样的表示,请参照第9章"异常诊断",实施对策以下举例异常发生显示。

[异常时] UV 主回路低电压 根据异常内容,表示也不一样

4.3.3 参数的初始化

- 交换了备品控制基板,且确认了变频器的容量(KVA)=o2-04参数后,请实施参数的初始化。新品初次试运行时,没有实施参数初始化的必要。
- 参数的初始化,请设定A1-03(初始化)="2220"。
- 初始化之后,存取级别(A1-01)便是QUICK-START。以下所示在QUICK-START状态下的设定方法。请按以下顺序给参数初始化

顺序	键	操作器的表示画面	说明
		频率指令 U1-01= 0.00Hz	
1	MENU	主菜单 监视模式	显示驱动方式
2	∧	主菜单 环境参数设定	显示环境设定方式
3	DATA ENTER	语言选择 中文	进入环境方式中
4	∧ 按3次	参数初始化 进行初始化	选择了初始化
5	DATA ENTER	A1-03=0*** 不进行初始化	显示初始化的参数(A1-03)
6	∧	A1-03=2220 2线制初始化	设定了2线制程序的初始化设定为(2220)
7	DATA ENTER	设置成功	设定值可写入"频率写入"约显0.5秒钟
		参数初始化 进行初始化	回到初始化显示状态
8	ESC	主菜单 环境参数设定	回到环境设定方式

4.3.4 设定输入电压

请根据电源电压正确设定变频器的输入电压(E1-01)参数

■ **设定输入电压:E1-01**

设定输入电压

参数No.	名称	运行中的改变	设定范围	单位	出厂时设定	存取级别	
						无PG V/f	无PG 矢量
E1-01	输入电压设定	×	310~510	VAC	400	Q	Q

以下所示400V级变频器输入电压为380V的设定举例。

顺序	键	操作器的表示画面	说明
		主菜单 环境参数设定	显示环境设定方式
1	∧	主菜单 应用参数设定	显示程序方式
2	DATA ENTER	频率指令方式 控制回路端子	进入程序方式
3	∧	输入电压设定 E1-01=400VAC	可选择输入电压设定
4	DATA ENTER	输入电压设定 400VAC	最先列闪烁
5	按10次 RESET	输入电压设定 400VAC	第2列闪烁
6	∨	输入电压设定 380VAC	设定为"8"
7	按2次 DATA ENTER	设置成功	设定值可写入,显示[频率写入完了]约0.5秒钟
		输入电压设定 E1-01=380VAC	回到输入电压显示(请确认数据是否更新了)
8	ESC	主菜单 应用参数设定	回到程序方式显示

■ 电机选择(电机过热保护):E1-02

在参数E1-02(电机选择)请设定使用电机的种类,作为电机过热保护的基准。

参数No.	名称	运行中的改变	设定范围	单位	出厂时设定	存取级别	
						无PG V/f	无PG 矢量
E1-02	电机选择 (电机过热保护)	×	0~2	-	0	Q	Q

● 设定值的说明

设定值	内容
0	标准电机(通用电机)
1	专用电机(变频器专用电机)
2	专用电机(矢量专用电机)

4.3.5 自学习

■ **自学习的操作**

按以下顺序实行自学习,电机参数便被自动设定了。

顺序	键	操作器的表示画面	说明
		主菜单 应用参数设定	显示程序方式
1	∧	主菜单 自学习方式	显示自学习方式
2	DATA/ENTER	额定电压 400.0VAC	显示电机额定电压
3	∧	额定电流 1.90A	显示电机额定电流
4	∧	额定频率 60.0Hz	显示电机额定频率
5	∧	额定转速 1750RPM	显示电机额定转速
6	∧	电机极数 4	显示电机极数
7	∧	电机选择 1	显示电机选择[第1电机](通常使用电机参数)的场合,请选择"1",不用改变。
8	∧	|/ 准备完毕 |/ /| 请按 RUN 键 /|	自学习开始的确认(按RUN键开始,变闪烁表示)
9	RUN	|/ Tune Proceeding |/ /| □ Hz □□□ A /|	自学习开始
		Tune Successful	("自学习过程中"闪烁表示) 自学习完了
10	MENU	主菜单 监视模式	回到驱动方式

*1 显示值与电机的额定值(铭牌值)有差异时,请修整各设定值。

*2 简单设定和精密设定的内容有所不同请参照下表。

操作器表示	电机铭牌值	精密设定 *
Rated Voltage	电机额定电压	额定转速时的空载电压
Rated Frequency	电机额定频率	额定转速时的空载频率

* 精密设定要求电机测试报告,设计数据等的详细数据。
矢量控制专用电机的额定电压比通用电机低10~20%左右。
务必参照电机的铭牌及测试报告,确认电压值。

注意 自学习方式为电机动动态自学习,因而在进行电机自学习时,电机轴上禁止有任何负载否则会损坏变频器

以下举例,将电机额定电流变更为"1.60A"的操作。

顺序	键	操作器的表示画面	说明
		额定电流 1.90A	显示电机额定电流
1	DATA ENTER	额定电流 001.90A	按下DATA/ENTER键(为了变更设定值)。成为变更对象的闪烁表示。
2	RESET 按3次	额定电流 001.90A	想要变更的列,闪烁表示。
3	∨ 按3次	额定电流 001.60A	"001.60A"被设定了
4	DATA ENTER	设置成功	按下DATA/ENTER键,写入设定值,"参数写入中"闪烁。
		额定电流 1.60A	回到电机额定电流显示。

- 自学习被正确的实行之后,则电机参数(E1-04~E2-09)被自动地写入了。
- 自学习中发生异常时,请按以下异常内容实施对策。

■ 自学习时的异常表示和对策

自学习时的异常表示和对策如下表所示,检出了异常时,在操作器上会显示。在运行中的电机则自由滑行减速, 并异常接点输出。轻故障接点输出不动作。异常发生时,显示"自学习中断"具体异常内容如下记闪烁表示。

表5.1　自学习时的异常表示和对策

异常表示	异常表示内容	说明	对策
Data Invalid	电机数据异常	自学习用的电机数据输入不良	●检查输入数据 ●检查变频器和电机的容量
Resistance	线间电阻异常	在所定的时间内,自学习不能结束	●检查输入数据 ●检查电机的接线
No-load Current	空载电流异常		
Saturation-1	铁心饱和系数1异常		
Saturation-2	铁心饱和系数2异常		
Rated Slip	额定滑差异常		
Accelerate	加速异常	在所定的时间,电机不加速	●加速时间(C1-01)太大 ●降低力矩极限值(L7-01,-02)的话,会增大 ●电机与机械负载连接着的情况,请脱开机械负载。
PG Direction	电机旋转方向异常	变频器和PG(A,B相),电机(U,V,W)的接线不良	●检查PG的接线 ●检查电机的接线 ●检查PG旋转方向及参数(F1-05)
Moteor Speed	电机速度异常	自学习时,力矩指令过大100%	●电机与机械负载连接着的情况,请脱开机械负载。 ●加速时间(C1-01)太大 ●检查输入数据(特别是PG脉冲数)
ALARM:Over Load	自学习负载过大	自学习时,力矩指令超过20%	显示电机单体自学习场合 检查输入数据(特别是PG脉冲数)
Tune Aborted Minor Fault:□□□	轻故障发生中	变频器发生了轻故障	检查□□□部分的轻故障内容
V/f Over Setting	V/f 设定过大	自学习时力矩指令超过100%且空载电流超过电机额定电流的70%	● 认设定值,并修正。 ● 脱开电机上的负载。

- 按下MENU键,异常表示被清除。
- 发生了异常时,设定了的参数(电机参数)全部被回到初始值,再做自学习时,请再次设定这些参数。

■ 不能自学习时,请用V/f控制

自学习不能正确实行时,显示"自学习中断"。请按以下顺序变更为V/f控制方式。

1.请变更为"无PG V/f控制"控制方式。

顺序	键	操作器的表示画面	说明
1	MENU	主菜单 监视模式	显示驱动方式
2	∧	主菜单 环境参数设定	显示环境设定方式
3	DATA ENTER	语言选择 中文	显示进入环境方式中 (选择语种)
4	∧ 按2次	控制方式选择 无PG矢量控制	显示选择控制方式
5	DATA ENTER	A1-02=2*** 无PG矢量控制	显示控制方式选择 (A1-02)
6	∨ 按2次	A1-02=0 V/f 控制	设定了无PG V/f控制
7	DATA ENTER	设置成功	设定值可写入
		控制方式选择 V/f 控制	回到控制方式选择显示
8	MENU	主菜单 监视模式	回到驱动方式显示

2.确认电机铭牌上的值,请设定以下3个参数。

参数No.	名称	运行中的改变	设定范围	单位	出厂时设定	存取级别	
						无PG V/f	无PG 矢量
E1-05	最大电压 (VMAX)	×	0.0~510.0	VAC	400.0	Q	Q
E1-06	基本频率(FA)	×	0.0~400.0	Hz	60.0	Q	Q
E2-01	电机额定电流	×	10~200%	A	*	Q	Q

电机额定电流的出厂设定根据变频器容量不同

如下所示这3个参数的设定顺序

顺序	键	操作器的表示画面	说明
		主菜单 监视模式	显示驱动方式
1	∧ 按2次	主菜单 应用程序设定	显示程序方式
2	DATA ENTER	频率指令方式 控制回路端子	进入了程序方式
3	∧ 按14次	最大输出电压 E1-05=400.0VAC	显示最大输出电压
4	∧	基频 E1-06=60.0Hz	显示基频
5	∧ 按5次	电机额定电流 E2-01=1.90A	显示电机额定电流
6	MENU	主菜单 监视方式	回到驱动方式显示

显示值与电机的额定值有差异时,请修正各设定值。

4.3.6 空载运行

这里以电机空载状态(负载机械和电机不连接状态),用数字操作器让电机旋转进行试运行为例,总结如下。

■ **频率指令的设定**

请在驱动方式的频率指令监视下,设定频率指令,如下所示设定10Hz频率指令的操作举例。

顺序	键	操作器的表示画面	说明
		主菜单 监视模式	显示驱动方式
1	DATA ENTER	频率指令 U1-01=0.00Hz	进入驱动方式,显示频率指令监视
2	LOCAL REMOTE	频率指令 U1-01=0.00Hz	切换到操作器运行
3	DATA ENTER	频率指令 000.00Hz	设定频率指令
4	RESET	频率指令 000.00Hz	十位数处闪烁显示
5	∧	频率指令 010.00Hz	设定"010.00Hz"
6	DATA ENTER	设置成功	设定值可写入
		频率指令 010.00Hz	回到频率设定显示

■ 用数字操作器进行运行

- 按下RUN键,电机开始旋转(正转)。
- 按下FWD/REV键,电机反转。
- 按下STOP键,电机停止转动,(停止前运行键的LED指示灯闪烁)。
- 运行中也可变更频率指令。这时按下DATA/ENTER键,设定值在写入瞬间变更了。
- 在停止状　按下JOG键,在按下此键的时间内按点动频率旋转(出厂设定6.0Hz)。

■ 运行状态的确认

- 改变频率指令或旋转方向,请确认电机是否有振动及杂音。
- 请确认变频器在运行过程中是否发生了异常。

4.3.7 有(带)负载运行

确认了按4.3.6电机空载状态的动作后,连接好负载,在有(带)负载状态进行试运行。

■ 连接机械负载

- 确认了电机完成处于停止状态后,给电机连接上机械负载。
- 紧固安装螺丝,使机械负载固定在电机轴上。

■ 用数字操作器进行运行

- 与空载运行一样,使用数字操作器进行有(带)负载运行。
- 为了预防万一的异常动作,请作好马上能够在操作器上按STOP键的准备。
- 首先请设定低于实际的动作速度约10%程度的频率指令。

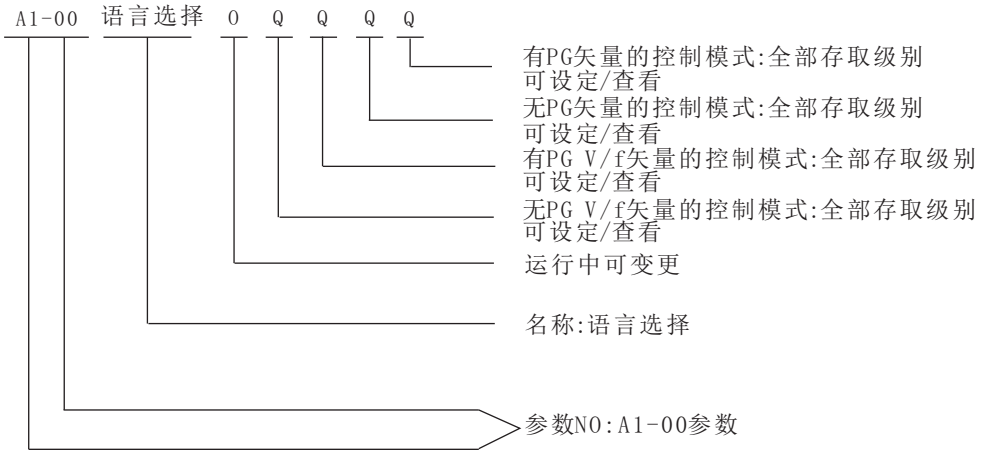
■ 运行状态的确认

- 请确认机械负载的动作方向是否正确,在低速机械负载的运行是否平滑后,再增大频率指令。
- 改变频率指令及旋转方向,请确认机械有否振动及有否杂音。
- 并在操作器的显示上监视U1-03(输出电流)是否过大了。

第五章　参数详细说明

■ 参数阅读指示

例：

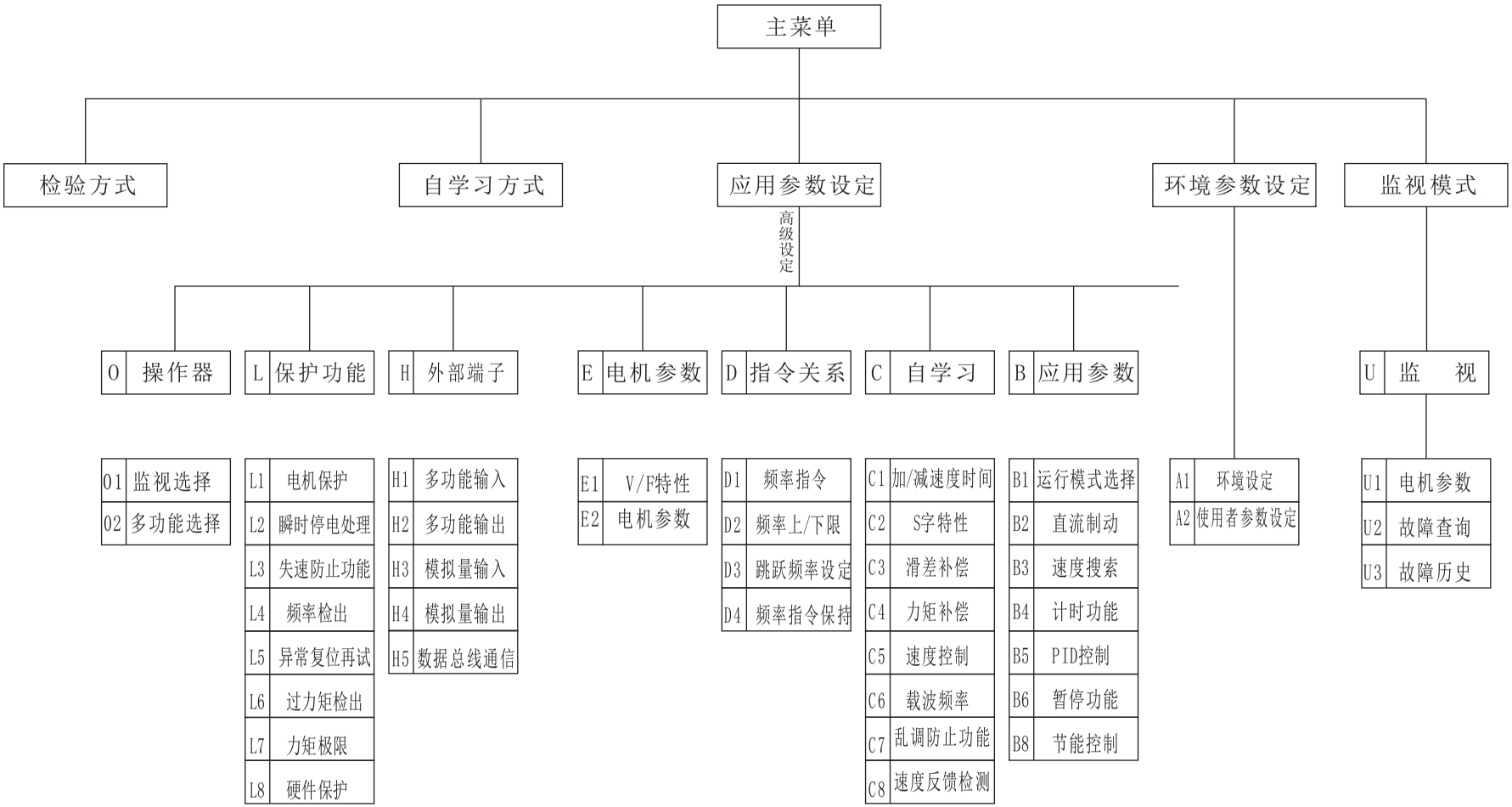


■ 参数的阅览方式

- 参数NO:　参数的编号
- 名称:　参数的名称
- 运行中的变更:　变频器运行中参数可否变更
  - 0 …　在运行中也可变更
  - X …　运行中不可变更
- 控制模式:　表示在哪一个控制方式可设定/查看,在哪一个存取级别可设定/查看。
  - Q …　QUICK-START,BASIC,ADVANCED的全部存取级别可设定/查看。
  - B …　ADUANCED,BASIC可设定/查看的项目
  - A …　只有ADVANCED可设定/查看的项目。
  - X …　在这个控制方式不可设定/查看的项目

注意 • YD3000N系列变频器不能装PG卡,所以不能工作在PG矢量控制和有PG V/F控制模式.所以修改与此相关的参数,可能会出现参数设置不良报警.

参数一览表


主菜单
检验方式
自学习方式
应用参数设定
高级设定
环境参数设定
监视模式
O 操作器
L 保护功能
H 外部端子
E 电机参数
D 指令关系
C 自学习
B 应用参数
U 监 视
O1 监视选择
O2 多功能选择
L1 电机保护
L2 瞬时停电处理
L3 失速防止功能
L4 频率检出
L5 异常复位再试
L6 过力矩检出
L7 力矩极限
L8 硬件保护
H1 多功能输入
H2 多功能输出
H3 模拟量输入
H4 模拟量输出
H5 数据总线通信
E1 V/F特性
E2 电机参数
D1 频率指令
D2 频率上/下限
D3 跳跃频率设定
D4 频率指令保持
C1 加/减速度时间
C2 S字特性
C3 滑差补偿
C4 力矩补偿
C5 速度控制
C6 载波频率
C7 乱调防止功能
C8 速度反馈检测
B1 运行模式选择
B2 直流制动
B3 速度搜索
B4 计时功能
B5 PID控制
B6 暂停功能
B8 节能控制
A1 环境设定
A2 使用者参数设定
U1 电机参数
U2 故障查询
U3 故障历史

5.1 环境参数设定

A1-00 语言选择 O Q Q Q Q
(Select Language)

取值

English [0]
中 文 ★ [1]

功能

数字式操作器显示语种选择

选择说明

切换操作器显示语种的参数
参数的初始化不能使该参数回到出厂设定值
若要变更到出厂设定值,请重新设定

A1-01 参数存取级别 O Q Q Q Q
(Access Level)

取值

监视专用 [0]
用户选择参数 [1]
快速设定:Q ★ [2]
基础设定:B [3]
高级设定:A [4]

功能

参数的存取级别(设定/查看范围)

选择说明

设定参数的存取级别(可查看设定的范围)
根据控制方式,也有不可查看设定的参数

A1-02 控制方式选择 X Q Q Q Q
(User Param 1to 32)

取值

无PG V/f控制 ★ [0]
无PG矢量控制 [2]

功能

变频器控制方式选择

选择说明

从4种控制方式中选择1个
参数的初始化不能自动地回到出厂设定。
要变更到出厂时设定,请再次设定。

A1-03 参数初始化 X Q Q Q Q
(Init Constants)

取值

不进行初始化 ★ [0]
用户设定初始化 [1110]
2线制初始化 [2220]
3线制初始化 [3330]

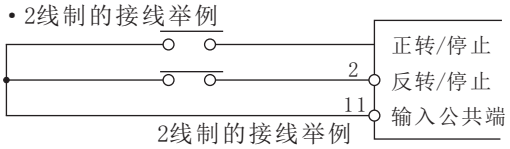
功能

变频器控制方式选择

选择说明

从4种控制方式中选择1个
用户设定的初始化
用户设定的初始化(1110),是用户将设定的 各参数作为初始值记忆。各参数设定后,在参数o2-o3(用户记忆参数)设定为"1",这些设定值作为初始值被记录了,记录后,o2-o3为"0"的场合,不能设定为"1110"(不显示)。

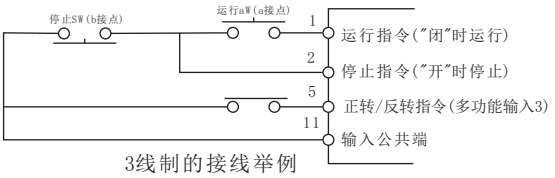
• 2线制的接线举例



2线制的接线举例

• 3线制的接线举例

多功能输入的初始化与2线制的初始化不同。设定3线制的状 ,用自动复位型开关可以进 行运行/停止操作



3线制的接线举例

A1-04 密码1 X Q Q Q Q
(Enter Password)

取值

0～9999 ★ [0]

功能

用已设定A1-05的密码输入。是禁止环境设定方式的 一部分参数写入的功能

A1-05 密码2 X Q Q Q Q
(Select Password)

取值

0～9999 ★ [0]

功能

设定密码为任意4位数字

选择说明

是禁止环境设定方式的一部分参数写入的功能。A1-04和A1-05的设定值不一致的话,A1-01~A1-03及A2-01~A2-32的参数不能变更。参数只能读取。想要写入禁止状 的场合,在A1-01~A1-03及A2-01~A2-32的参数设定后,在A1-05请设 定密码,A1-04被显示的状 下在按下RESET 键同时按MENU键,才被显示。通常的按键操作不能显示。

参考下页图[操作举例]:

★=出厂设定值

[操作举例]2线制初始化操作

请按如下顺序初始化。这是回到出厂设定的操作。

顺序	按键	操作器的表示画面	说明
1	MENU	主菜单 监视模式	
2	△	主菜单 环境参数设定	
3	READ/WRITE	语言选择 中文	
4	△	参数初始化 不进行初始化	
按3次			
5	READ/WRITE	A1-03=0*** 不进行初始化	
6	△	A1-03= 2220 2线制初始化	
7	READ/WRITE	设置成功	设定值已写入
		参数初始化 不进行初始化	数秒钟后，操作器的显示画面如左图所示那样。

在此,2线制已初始化了。

[操作举例] 以密码为“1000”为例的设定操作

按以下顺序设定密码

顺序	按键	操作器的表示画面	说明
1	MENU	主菜单 监视模式	
2	△	主菜单 环境参数设定	
3	READ/WRITE	语言选择 中文	
4	△	密码1 A1-04=0	
按4次			
5	▷ RESET	密码1 A1-04= 0	
按下的期间			
	MENU	密码2 A1-05= 0	
6	再按下 READ/WRITE	密码2 0000	最左列的位闪烁表示。这个闪烁中的列可以 变更数字。 用增加键,每按一次,数值也一一增加,但按了10次以上,也只停留在"9"数字上。要减小数值时,请按下减少键,直到想要设定值为止。
7	△	密码2 1000	
8	READ/WRITE	设置成功	设定值已写入。
		密码2 A1-05=1000	
9	ESC	密码1 A1-04=0	数秒钟后,操作器的显示画面如左图所示。

在此,作为密码,1000已设定好了。
解除密码时,请设定A1-05=0。

★ =出厂设定值

A2-01toA2-32使用者参数设定 (User Param1 to 32)	X	A	A	A	A
取值					
b1-01~o1-01				★	—

功能

可设定/查看的参数的编号(最大32个)

选择说明

存取级别(A1-01),设定为"1"(有效存取级别为ADVANCED)时,不能进行参数的读取,设定存取级别在用户选择参数范围内。

5.2: 程序模式参数-应用(b)的参数

5.2.1 运行模式选择:b1

b1-01 频率指令方式 (Reference selection)	0	Q	Q	Q	Q
取值					
数字式操作器					[0]
控制回路端子(模拟量输入)				★	[1]
串行通信					[2]
选择卡					[3]
MEMOBUS(CP-717专用)					[4]

功能

选择频率指令输入方法

选择说明

从控制回路端子(外部端子)设定指令频率,请设定"1",信号电平参考H3参数组。

b1-02 运行指令选择 (Run Source)	X	Q	Q	Q	Q
取值					
数字式操作器					[0]
控制回路端子(顺控器输入)				★	[1]
串行通信					[2]
选择卡					[3]
MEMOBUS					[4]

功能

运行指令的输入方法的设定

选择说明

请设定运行指令从哪　输入。已设定为控制回路端子(外部端子)场合,请用正转/停止,反转/停止的2线制运行。初始化用3线制场合,及在多功能输入已经设定为"0"(3线制)场合,则请用运行,停止,正转/反转的3线制运行。

参考A1-03参数

b1-03 停止方式选择 (Stopping Method)	X	Q	Q	Q	Q
取值					
减速停止				★	[0]
自由停车					[1]
直流制动停止					[2]
计数自由停车					[3]

功能

停止方法的设定

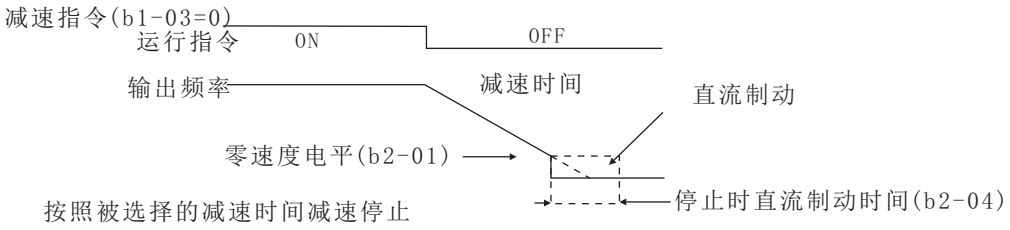
选择说明

请设定停止指令输入时的停止方法

计数自由停车:有计时器的自由滑行停止

★=出厂设定值

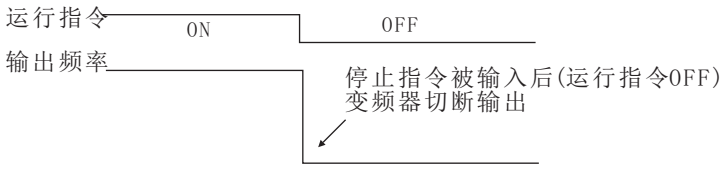
以下是各种停止方法的图示



按照被选择的减速时间减速停止

减速停止

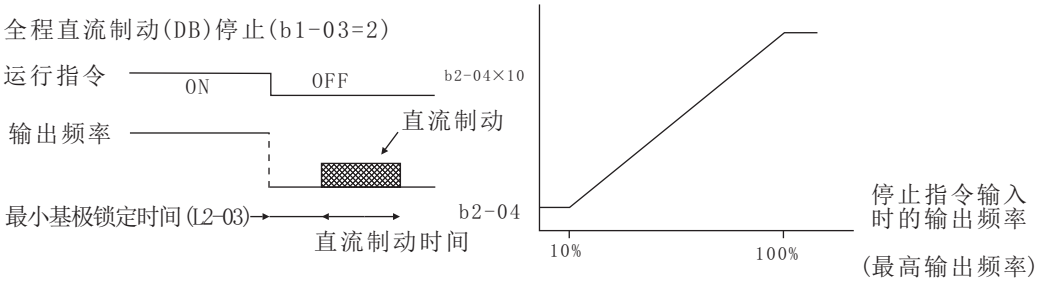
自由滑行停止(b1-03=1)



停止指令输入后，在经过最小基极锁定(BB)时间(L2-03)以前,
将无视运行指令。

自由滑行停止

全程直流制动(DB)停止(b1-03=2)



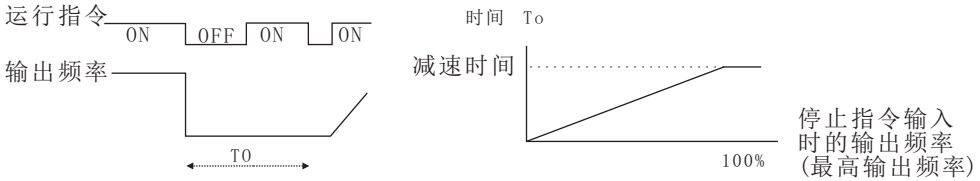
停止指令被输入了，经过最小基极锁定(BB)时间(L2-03)后,加上直流制动便停止了。直流制动时间,根据停止指令输入时输出频率和停止时直流制动时间(b2-04)的设定值来决定。

全程直流制动(DB)停止

重要

停止过程中发生OC(过电流)场合,请延长最小BB时间(L2-03)感应式电机,切断电源后,由于电机内部变化的磁场而再生了电能。这时加上了直流制动,便会有OC检出。

有时间限制的自由滑行停止(b1-03=3)



停止指令输入后,在时间To经过以前,将与运行指令无关,时间To,根据停止指令输入时的输出频率和减速时间来决定.

有时间限制的自由滑行停止

★ =出厂设定值

b1-04 反转禁止 X B B B B
(Reverse Oper)

取值

可反转 ★ [0]
禁止反转 [1]

功能

反转禁止的设定

选择说明

使用在电机禁止反转的场合。

b1-05 低频运行方式 X X X X A
(Zero-Speed Oper)

取值

按频率指令 ★ [0]
切断输出 [1]
按(E1-09)运行 [2]
零速运行 [3]

功能

输入的频率指令低于最低输出频率(E1-09)时的运行方法的设定。仅在有PG矢量控制方式有效

选择说明

选择低于最低输出频率的频率指令输入时的运行方法

b1-06 端子扫描时间 X X X X A
(Cntl Input Scans)

取值

每隔2ms(高应答性场合) ★ [0]
每隔5ms(考虑到噪声引起误动作的场合) [1]

功能

程序输入(正转/反转、多功能输入)的应答性设定。

选择说明

请设定程序输入(正转/反转、多功能输入)
的应答性。

b1-07 运行切换方式 X A A A A
(LOC/REM RUN Sel)

取值

切换不运行 ★ [0]
切换运行 [1]

功能

运行指令切换后的运行选择

选择说明

运行指令从本地(操作器)切换到远程(控制回路端子)时的运行互锁。

b1-08 程序模式运行 X A A A A
(RUN CMD at PRG)

取值

不可运行 ★ [0]
可以运行(运行指令的选择为数字式操器时(B1-02=0)时无效) [1]

功能

程序模式时的运行互锁

5.2.2 直流制动:b2

b2-01 制动开始频率 X B B B B
(DCInj Start Freq)

取值

0.0~10.0 ★ [0.5]

功能

减速停止时直流制动开始频率。单位为Hz。

选择说明

所谓直流制动功能,是供给电机直流电流,让电机减速的功能,有如下2种:
起动时直流制动:让由于惯性等作用仍在旋转的电机停止,并再起动时有效。
停止时直流制动:负载很大场合,通常的减速不能使电机停止,惯性仍使转动时调整,延长直流制动时间或增长直流制动电流都可缩短停止时间。
零速度级别(b2-01)请设定减速时直流制动的开始频率,零速度级别低于最低输出频率(E1-09)场合,从最低输出频率开始,直流制动开始。

b2-02 直流制动电流 X B B B X
(Dcinj Current)

取值

0~100 ★ [50]

功能

直流制动电流,设定直流制动时输出电流值

选择说明

直流制电流(b2-02)参数,请以变频器的额定电流为100%,以%为单位设定。

b2-03 启动制动时间 X B B B B
(DCinj Time @Start)

取值

0.00~10.00 ★ [0.00]

功能

电机起动时直流制动

选择说明

多功能输入端子的直流制动指令与初始励磁指令并用,只有端子输入为"开"后,且在b2-03的设定时间内进行直流制动。

b2-04 停止制动时间 X B B B B
(DCInj Time @Stop)

取值

0.00~10.00 ★ [0.50]

功能

停止时直流制动

选择说明

请设定电机停止时直流制动动作时间,防止停止的电机滑行。

b2-08 磁通补偿 X - - A A
(Fidld Comp @Start)

取值

0~500 ★ [0]

功能

磁通量补偿量,以空载电流值作为100%,以%单位设定

选择说明

b2-08参数,设定为100%以上的话,起动时直流制动(初始励磁)开始时的电流会较大,电机内的磁通量可很快达到。当b2-08设定为200%时,达到时间将缩短一半。
b2-08参数,设定为100%以下的话,磁通量将缓慢地达 到。(通常请勿将b2-08设定在100%以下,但b2-08=0%和 b2-08=100%的动作是一 样的,都由已设定的直流制动电流(b2-02)的值来达到磁通量)。

★=出厂设定值

将b2-08设定值增加,起动时直流制动中的电机发出 声音也会增大。
电机达到一定磁通量时的电气的时间参数,由电机参数E2的设定值通过下式求得。2回路时间参数$T2=[(E2-01^2-E2-03^2)/(2\pi XE2-02XE2-03)]^{1/2}$(sec)。由于起动时直流制动(初始励磁)时间b2-03而有控制开始的延迟问题时,请不要使用本功能,而使用多功能接点输入的直流制动指令(设定值:60)按电机停止所持有的磁通量建立磁场。

5.2.3 速度搜索:b3

b3-01 启动时搜索 (Spdsrch at Start)	X A A A A
取值	
速度搜索无效	[0]
速度搜索有效	★ [1]

功能

设定运行指令输入时的速度搜索功能

选择说明

使用速度搜索功能场合,请设定为"1",每一次运行指令被输入时作速度搜索。无PG的控制方式,速度搜索为任意场合,在多功能输入(H1-01~H1-06),请设定外部速度搜索指令(设定值:61或62)。

b3-02 搜索动作电流 (SpdSrch Current)	X A X A X
取值	
0~200	★ [100]

功能

速度搜索时的动作电流,以变频器额定电流为100%,按%单位设定。

选择说明

无PG V/F控制时默认值为150,无PG矢量控制时默认值为100.
设定速度搜索时的动作电流,在此设定值,不可再起动时,请降低设定值。

b3-03 搜索减速时间 (SpdSrch Dec Time)	X A X A X
取值	
0.1~10.0	★ [2.0]

功能

设定从最高输出频率到0Hz的减速时间。以秒为单位设定。

选择说明

设定了速度搜索及直流制动,还要设定最小基极锁定时间(L2-03),即电机残留电压消耗到零的时间。速度搜索及直流制动的开始时,检出OC(过电流)的话,请增大设定值,使之不发生故障。

5.2.4 计时功能:b4

b4-01 On延迟时间 (Delay-ON Timer)	X A A A A
取值	
0.0~300.0	★ [0.0]

功能

计时功能输入对计时功能输出为ON延迟时间,用秒单位设定。

选择说明

在多功能输入及多功能输出,各种计时功能输入(设定值:18)及计时功能输出(设定值:12)被设定了场合有效。这些输入输出,可成为通用顺序控制。通过设定了延迟时间,可去除检测、开关等的振荡干扰。计时功能输入为ON的时间长于此设定值时,计时功能输出为ON。

b4-02 OFF延迟时间 (Delay-OFF Timer)	X A A A A
取值	
0.0~300.0	★ [0.0]

功能

计时功能输入对计时功能输出的OFF延迟时间,用秒单位设定。

选择说明

在多功能输入及多功能输出,各种计时功能输入(设定值:18)及计时功能输出(设定值:12)被设定了场合,成为有效。这些输入输出,可成为通用顺序控制,设定了延迟时间,可去除检测、开关等的振荡干扰.计时功能输入为OFF的时间长于b4-02(计时功能的OFF延迟时间)的设定值,计时功能输出为OFF。

5.2.5 PID控制:b5

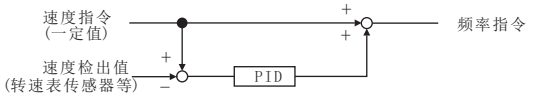
b5-01 PID模式 (PID Mode)	X A A A A
取值	
PID控制无效	★ [0]
PID控制方式1(PID控制有效,偏差由D控制)	[1]
PID控制方式2(PID控制有效,反馈值由D控制)	[2]
PID控制方式3(PID控制有效,频率指令+PID控制偏差由D控制)	[3]
PID控制方式4(PID控制有效,频率指令+PID控制反馈值由D控制)	[4]

功能

使用了PID控制的变频器控制方式

选择说明

PID是让反馈值(检出值)与已设定的目标值一致的控制方式,由比例(P)控制、积分(I)控制、微分(D)控制组合,也可对其它对象(机械系统)进行控制。目标值的输入已设定为b1-01=0(数字操作器)场合,设定值以o1-03=1(%单位),目标值请以%值输入。(速度指令切换时,100%作为最高频率指令值)反馈值由多功能模拟量输入端子或频率指令(电流)端子输入。多功能模拟量输入端子16功能选择(H3-05)或频率指令(电流)端子14功能选择(H3-09)的哪一个,设定为PID反馈值(设定值:B)。反馈量的调整,请使用模拟量输入端子的增益,偏置来进行。
如图所示,设定值为3.4的速度控制的应用举例。



设定值3,4的应用举例

★=出厂设定值

PID控制的用途

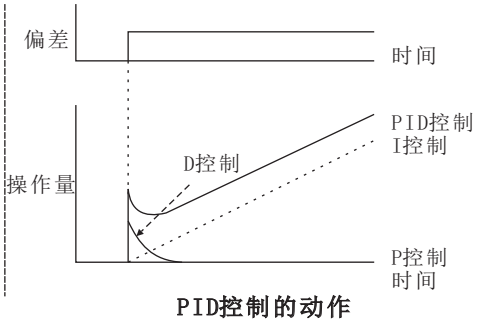
使用了PID控制的变频器的用途举例,如表所示。

PID控制的用途举例

用途	控制内容	使用检测器(例)
速度控制	• 取机械的速度值作反馈信号,使速度与目标值一致。 • 其　的机械速度值作为目标值输入,实际速度作为反馈值进行同步控制。	转速传感器
压力控制	以压力值作为反馈信号,控制一定的压力	压力传感器
流量控制	以流量值作为反馈信号,控制流量精度	流量传感器
温度控制	以温度值作为反馈信号,控制风扇运转来控制温度。	• 热电偶 • 热敏电阻

PID控制的动作

为了使PID控制的各控制动作(P控制,I控制,D控制的动作)容易理解,以偏差(目标值与反馈值的差)为一定量与操作量(输出频率)的变化如图所示。



PID控制的动作

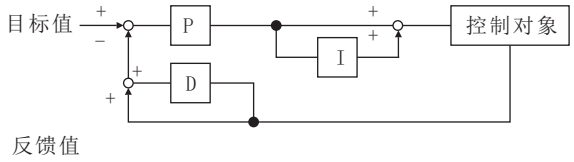
PID控制的动作

- P控制:操作量按偏差比例输出,只有P控制时,偏差为零则不能控制。
- I控制:操作量按偏差的积分输出,使反馈值与目标值一致。但不能追踪剧烈的变化。
- D控制:操作量按偏差的微分输出。剧烈的变化地响应。
- PID控制:巧妙组合控制的特长,可进行最佳控制。

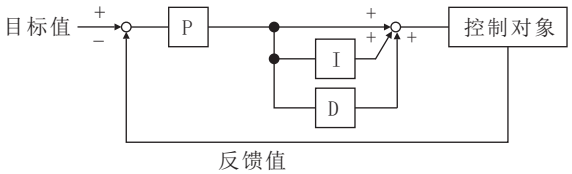
PID控制的种类

变频器可有2种PID控制,通常使用测定值微分型PID控制。

• 测定值微分型PID控制:是对反馈值进行微分的PID控制,也可对应目标值的变化和控制对象的变化。



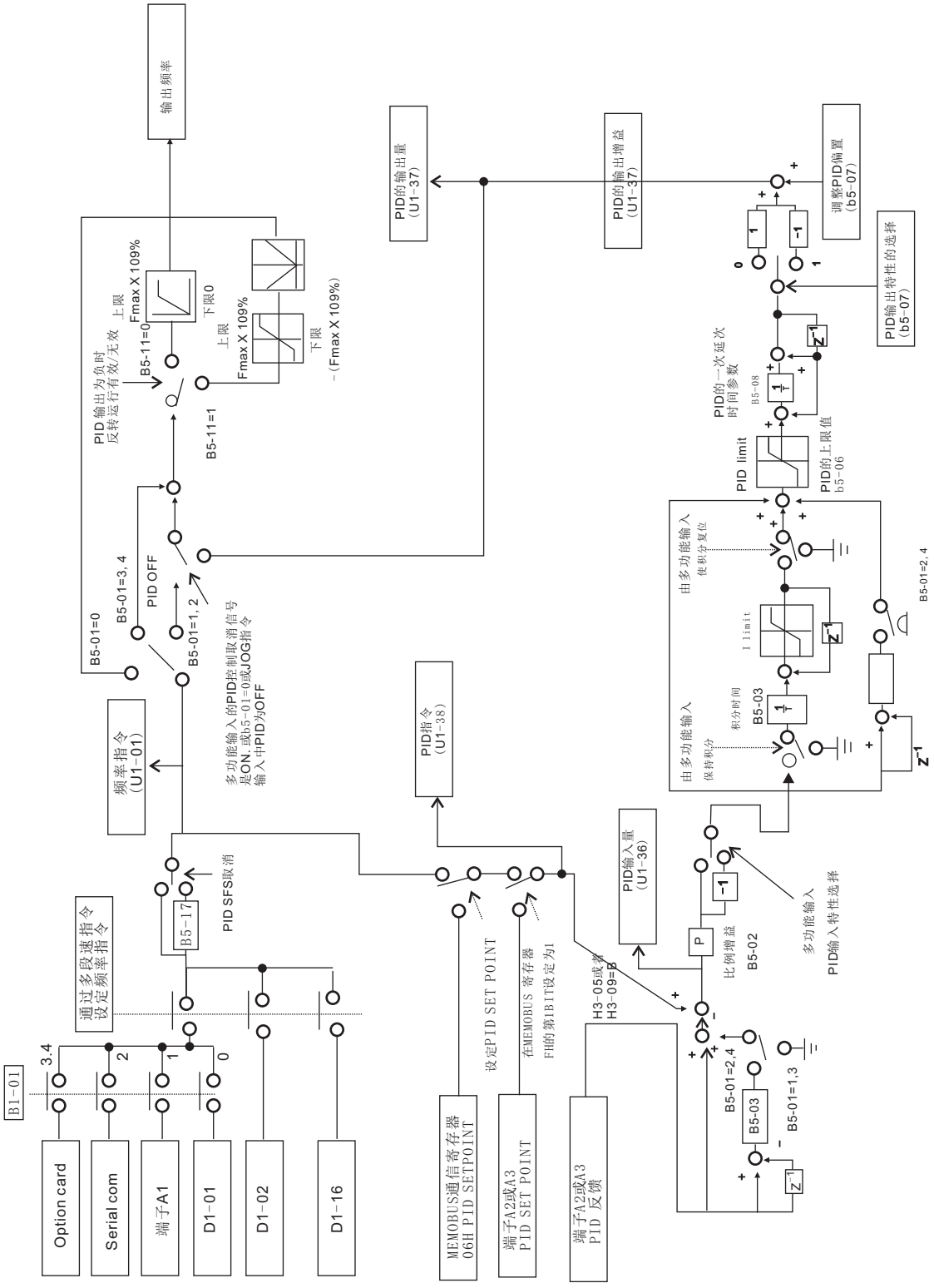
• 基本PID控制:是PID控制的基本型。为了追踪控制对象的变化而过分调整D控制的响应值的话,当目标值已变化时,可能会发生不足或过冲现象。



★=出厂设定值

变频器的PID控制功能

变频器内部的PID控制方框如图所示



PID控制方框图

★=出厂设定值

b5-02 比例增益 O A A A A
(PID Gain)

取值

0.00~25.00 ★[1.00]

功能

P控制的比例增益设定为倍率。

选择说明

PID控制的应答性,请调整比例增益(P),积分时间(I),微分时间(D)。实际调试中,要让负载一边运行一边调整应答性,使之最佳状 ,当被设定为0.00时,控制(各P,I,D控制)将不动作。

b5-03 积分时间 O A A A A
(PID I Time)

取值

0.0~360.0 ★[1.0]

功能

I控制的积分时间以秒为单位设定

选择说明

PID控制的应答性,请调整比例增益(P)积分时间(I),微分时间(D)。实际调试中,要让负载一边运行一边调整应答性,使之最佳状 ,当被设定为0.00时,控制(各P,I,D控制)将不动作。

b5-04 积分时间上限 O A A A A
(PID I Limit)

取值

0.0~100.0 ★ [100.0]

功能

I控制后的上限值,以最高输出频率为100%。以%为单位设定。

选择说明

PID控制中,是不让积分控制的计算超过一定量的参数。通常没有必要变更出厂设定值。当负载发生了剧烈失速时,变频器的响应迟缓使得负载受到破损,以及电机失去控制的场合,请减小设定值。设定值太小,目标值与反馈值将不能一致。

b5-05 微分时间 O A A A A
(PID D Time)

取值

0.0~10.0 ★[0.00]

功能

D控制的微分时间,以秒为单位设定

选择说明

PID控制的应答性,请调整比例增益(P)积分时间(I),微分时间(D)。实际调试中,要让负载一边运行一边调整应答性,使之最佳状 ,当被设定为0.00时,控制(各P,I,D控制)将不动作。

b5-06 PID上限 O A A A A
(PID Limit)

取值

0.0~100.0 ★[100.0]

功能

PID控制后的上限值,以最高输出频率为100%,以%为单位设定。

选择说明

PID控制后,不让频率指令超过一定值的参数。

b5-07 PID偏置调整 O A A A A
(PID Offset)

取值

-100.0~+100.0 ★[0.0]

功能

调整PID控制的偏置,以最高输出频率为100%,以%为单位设定。

选择说明

目标值和反馈值同为零时,变频器的输出频率请调整为零。

b5-08 PID延迟时间 O A A A A
(PID Delay Time)

取值

0.00~10.0 ★[0.00]

功能

PID控制的输出的低通滤波器的时间参数,以秒为单位设定

选择说明

通常没有必要变更出厂设定值。在机械的粘性摩擦太大或刚性较低等场合,机械系统发生共振,请设定比共振频率的周期更长的时间参数,虽然应答性较低,但可避开共振。

b5-09 PID输出特性 X A A A A
(Output Level Sel)

取值

输出正特性 ★[0]
输出反特性 [1]

功能

PID输出的正/反特性选择。

b5-10 PID输出增益 X A A A A
(Output Gain)

取值

0.0~25.0 ★[1.0]

功能

PID输出增益设定

b5-11 PID逆转选择 X A A A A
(Output Rev Sel)

取值

负时0极限(不反转) ★[0]
负时反转运行 [1]

功能

PID输出的逆转选择

选择说明

在b1-04参数,选择了反转禁止场合,则不会反转。当PID控制的输出为负值时,可以让变频器反转输出。但是如果在B1-04(选择禁止反转)正设定为1(禁止反转)时,PID输出19,0为极限

b5-12 反馈丧失检出 X A A A A
(Fb los Det Sel)

取值

丧失无检出 ★[0]
有检出,运行 [1]
有检出,滑停 [2]

选择说明

[0]:无PID反馈指令丧失检出

★=出厂设定值

[1]:有PID反馈指令丧失检出,检出时继续运行,故障接点不动作
[2]:有PID反馈指令丧失检出,检出时自由滑行停止,故障接点动作

b5-13 丧失检出值 (FB los DET Lv1)	X	A	A	A	A

取值
0~100 ★ [0]

功能
PID反馈指令丧　检出级别,以最高输出频率为100%,以%单位设定

b5-14 丧失检出时间 (Fb los Det Time)	X	A	A	A	A

取值
0.0~25.5 ★ [1.0]

功能
PID反馈指令丧失检出时间以秒为单位设定

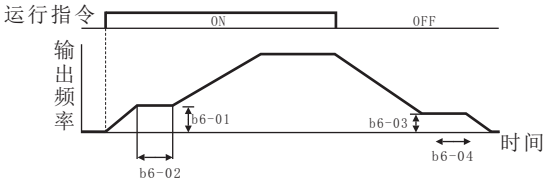
5.2.6 暂停功能:b6

b6-01 暂停启动频率 (Dwell Ref@Start)	X	A	A	A	A

取值
0.0~400.0 ★ [0.0]

功能
DWELL(暂停)功能的设定

选择说明
DWELL功能,是对较重的负载在起动、停止时,保持输出频率的功能。通过短暂保持输出,可防止发生失速状　。
这些参数的关系由下图所示。



DWELL功能的时序图

b6-02 暂停启动时间 (Dwell Time@Start)	X	A	A	A	A

取值
0.0~10.0 ★ [0.0]

功能
DWELL(暂停)功能的设定。

选择说明
参数的关系由上图所示。

b6-03 暂停停止频率 (Dwell Ref@Stop)	X	A	A	A	A

取值
0.0~400.0 ★ [0.0]

功能
DWELL(暂停)功能的设定。

选择说明
参数的关系由上图所示。

b6-04 暂停停止时间 (Dwell Time@Stop)	X	A	A	A	A

取值
0.0~10.0 ★ [0.0]

功能
DWELL(暂停)功能的设定。

选择说明
参数的关系由上图所示。

5.2.7 节能控制:b8

b8-01 节能控制增益 (Energy Save Gain)	X	A	A	X	X

取值
0~100 ★ [80]

功能
已经输入了节能指令时,变频器输出电压的设定

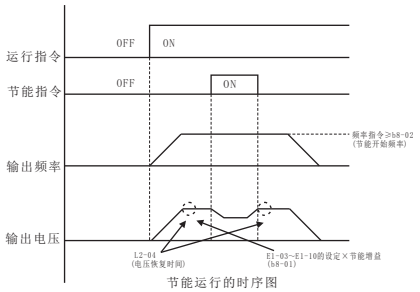
选择说明
节能指令被输入时,请设定变频器的输出电压,将已经设好的V/f曲线的电压作为100%,以%为单位设定。节能指令ON/OFF时的电压变化,按照电压恢复时间(L2-04)的设定

b8-02 开始频率 (Energy Save Freq)	X	A	A	X	X

取值
0.0~400.0 ★ [0.0]

功能
节能控制有效范围的频率下限,用Hz为单位设定

选择说明
节能指令,从节能开始频率以上的频率开始,且仅在速度一致状　有效。节能运行的时序图按如下所示。



节能运行的时序图

5.3: 自学习(C)参数

5.3.1 加减速时间:C1

C1-01 加速时间1 (Accel Time 1)	O	Q	Q	Q	Q

取值
0.0~6000.0 ★ [10.0]

功能
从最高输出频率的0%加速到100%所需时间,以秒为单位

C1-02 减速时间1 (Decel Time 1)	O	Q	Q	Q	Q

取值
0.0~6000.0 ★ [10.0]

功能
从最高输出频率的100%减速到0%所需时间,以秒为单位

C1-03 加速时间2 (Accel Time 2)	O	B	B	B	B

取值
0.0~6000.0 ★ [10.0]

功能
多功能输入"加减速时间选择1"ON时的加速时间

★ =出厂设定值

C1-04 减速时间2 (Decel Time 2)	0	B	B	B	B

取值

0.0~6000.0 ★[10.0]

功能

多功能输入"加减速时间选择2"ON时的减速时间

C1-05 加速时间3 (Accel Time 3)	X	A	A	A	A

取值

0.0~6000.0 ★[10.0]

功能

多功能输入"加减速时间选择2"ON时的加速时间

C1-06 减速时间3 (Decel Time3)	X	A	A	A	A

取值

0.0~6000.0 ★[10.0]

功能

多功能输入"加减速时间选择2"ON时的减速时间

C1-07 加速时间4 (Accel Time 4)	X	A	A	A	A

取值

0.0~6000.0 ★[10.0]

功能

多功能输入"加减速时间选择1"及"加减速时间选择2"On时的加速度时间

C1-08 减速时间4 (Decel Time4)	X	A	A	A	A

取值

0.0~6000.0 ★[10.0]

功能

多功能输入"加减速时间选择1"及"加减速时间选择2"ON时的减速时间

选择说明

加减速时间,可分别设定1～4的4个种类。使用加减速是时间2～4的场合,请在多功能输入(H1-01～H1-06)设定加减速时间选择1及设定加减速时间2。设定范围由C1-10(加减速时间的单位)的设定值而变化。C1-10设定为"0"(0.01秒为单位)场合,则设定范围0.00～600.00(秒)。

C1-09 紧急停止时间 (Fast Stop Time)	X	B	B	B	B

取值

0.0～6000.0 ★[10.0]

功能

多功能输入非常停止为ON时的减速时间

选择说明

是设定被输入了非常停止后的减速时间及异常检出时的减速时间。请设定从最高输出频率的100%到0%的时间。使用非常停止的场合,在多功能输入(H1-01～H1-06)请设定非常停止。

C1-10 时间单位 (Acc/Dec Units)	X	A	A	A	A

取值

0.01秒单位 [0]

0.1秒单位 ★[1]

功能

多功能输入非常停止为ON时的加速时间。

选择说明

想要较精细地设定加速时间场合,请设定为"0"。但设定范围较窄

C1-11 切换频率 (Acc/Dec SW Freq)	X	A	A	A	A

取值

0.0~400.0 ★[0.0]

功能

加减速时间的自动切换频率的设定

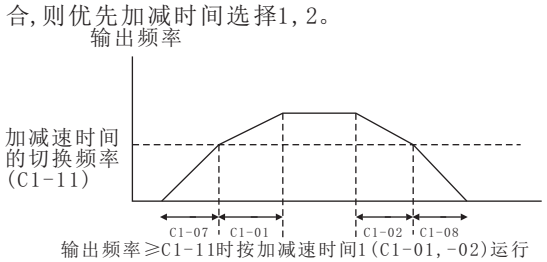
设定频率未满:加减速时间4

设定频率以上:加减速时间1

选择说明

在已经设定的频率点,想要进行自动切换加减速时间的场合,请设定该频率点。

在多功能输入已输入了加减速时间选择1,2的场合,则优先加减时间选择1,2。



输出频率≥C1-11时按加减速时间1(C1-01,-02)运行

输出频率<C1-11按时加减速时间4(C1-07,-08)运行

加减速时间的切换频率

5.3.2 S字特性:C2

C2-01 加速开始时间 (SCrv Acc @ Start)	X	A	A	A	A

取值

0.0~2.50 ★[0.20]

功能

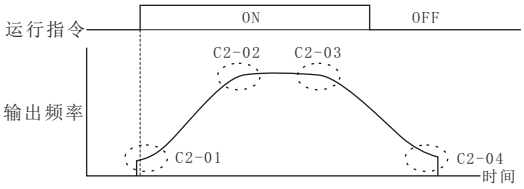
各部的S字特性时间以秒为单位设定

选择说明

按照S字曲线进行减速运行,可减小机械在起动、停止时的冲击。

变频器可以设定加速开始,加速完成,减速开始减完成时的各种S字特性参数。

这些参数的关系由下图所示。



S 字特性功能的设定

设定了S字特性时间,加减速时间按下式延长:

加速时间=已选择的加速时间+(加速开始时的S字特性时间+加速完成时的S字特性时间)/2。

减速时间=已选择的减速时间+(减速开始时的S字特性时间+减速完成时的S字特性时间)/2。

★=出厂设定值

C2-02 加速结束时间 X A A A A
(SCrv Acc @ End)

取值

0.0~2.50 ★[0.20]

功能

各部的S字特性时间以秒为单位设定

C2-03 减速开始时间 X A A A A
(SCrv Dec @ Start)

取值

0.0~2.50 ★[0.20]

功能

各部的S字特性时间以秒为单位设定

C2-04 减速结束时间 X A A A A
(SCrv Dec@ Endt)

取值

0.00~2.50 ★[0.00]

功能

各部的S字特性时间以秒为单位设定

5.3.3 滑差补偿:C3

C3-01 滑差补偿增益 0 B X B B
(Slip Comp Gain)

取值

0.0~2.5 ★[0.0]

功能

滑差补偿功能,是从输出电流计算电机的输出力矩,补偿输出频率的功能。 高负载动作的速度精度场合使用,主要在无PG V/f控制方式有效。

选择说明

通常没有必要设定
无PG V/f:"0.0"
无PG矢量:"1.0"
设定为"1.0"时,按额定力矩输出状 和已设定的滑差来补偿。
滑差补偿增益的调整顺序
1. 请正确设定电机额定滑差(E2-02)/电机空载电流(E2-03)电机额定滑差,可从电机铭牌上记载的数值按下式计算得到:电机额定滑差量[Hz]=电机额定频率[Hz]-额定转速[r/min]×电机极数/120电机空载电流,请设定在额定电压、额定频率的值,矢量控制,自学习后会自动将电机额定滑差设定完成。
2. 滑差补偿增益(C3-01),请设定为"1.0"。设定为"0.0"时,滑差补偿无效。
3.让负载运行,测量速度调整滑差补偿增益,请以0.1为单位增减调整。速度低于目标植,增大滑差补偿增益。速度高于目标值,减小滑差补偿增益。

C3-02 一次延迟时间 X A X A X
(Slip Comp Time)

取值

0~10000 ★[2000]

功能

滑差补偿功能的一次延迟时间参数,以ms为单位设定

选择说明

通常不要设定,当滑差补偿的应答性太低时,及速度不稳定场合,请调整。应答性低:减小设定值;速度不稳定:增大设定值

C3-03 滑差补偿极限 X A X A X
(Slip Comp Limit)

取值

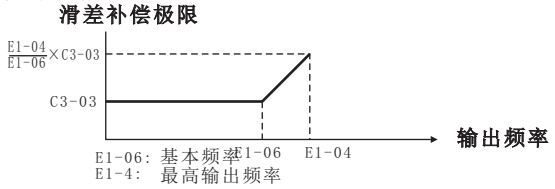
0~250 ★ [200]

功能

滑差补偿功能的补偿量的上限值,以电机额定滑差为100%,%单位设定

选择说明

速度低于目标值,即使调整了滑差补偿增益,也没有变化的场合,有可能达到了滑差补偿极限。增大极限值,请再确认。但是在指令频率和滑差补偿极限已足够场合,请在不超过机械的允许速度范围内设定。在恒力矩场合、恒功率场合,滑差补偿极限。如下图所示



C3-04 再生滑差补偿 X A X A X
(Slip Comp Regen)

取值

补偿无效 ★ [0]
补偿有效 [1]

功能

再生动作中的滑差补偿选择

选择说明

请设定再生中的滑差补偿功能有效/无效。当使用此功能时,再生能量瞬间增大,因此需要加以控制(如用制动电阻、制动电阻单元)

C3-05 磁通计算方法 X A X A X
(Flux Select)

取值

用补偿后频率 ★ [0]
用补偿前频率 [1]

功能

磁通量的计算方法的选择

选择说明

[0]:用补偿后的输出频率计算磁通量
[1]:用补偿前的输出频率计算磁通量

C3-06 输出电压限制 X X X A
(Output V Limit)

取值

无效 ★ [0]
有效 [1]

功能

输出电压限制动作选择

选择说明

输出电压限制动作无效时,发生了输出电压饱和状态的话,虽然输出电流等没有发生什么变化,但力矩精度得不到保障了。对力矩精度有要求的场合,请设定输出电压限制动作有效。
输出电压限制动作有效时,自动控制电机磁通量电流,由于输出电压受到限制, 力矩精度得到确保。这时输出电流与输出电压限制动作无效场合相比,最大有10%程度(额定负载时)增加,所以要 确认变频器的电流极限。

★=出厂设定值

(注)1、仅使用在中、低的场合,电源电压高于电机额定电压10%的场合,或在高速领域不考虑的力矩控制精度时,则C3-06不用变更。

2、电源电压与电机额定电压相比低得多的场合,即使输出电压限制动作有效,力矩控制精度也得不到确保。

5.3.4 力矩补偿:C4

C4-01 力矩增益补偿 (Torq Comp Gain)	0	B	B	B	X

取值

0.00~2.50 ★[1.00]

功能

力矩补偿的增益按倍率设定

选择说明

通常,没有必要调整。V/f控制时,如下场合请调整。
电缆太长时:增大设定值
电机功率小于变频器功率时:增大设定值
电机振动时:减小设定值
力矩补偿增益:请在低转速时输出电流不超过变频器额定输出电流范围内调整。
无PG矢量控制场合,请勿调整。

C4-02 时间延迟 (Torq Comp Time)	X	A	A	A	X

取值

0~10000 ★[200]

功能

力矩补偿功能的一次延迟,以ms为单位设定

选择说明

控制方式不同,出厂设定也不同:
"无PG v/f:200","无PG矢量:20"通常,没有必要调整,如下场合请调整。
电机振动场合:增大设定值
电机的应答性差场合:减小设定值

C4-03 正转启动力矩 (F TorqCmp@Start)	X	X	X	A	X

取值

0.00~200.00 ★[0.0]

功能

以电机的额定力矩为100%设定

C4-04 反转启动力矩 (R TorqCmp@Start)	X	X	X	A	X

取值

-200.0~0.0 ★[0.0]

功能

以电机的额定力矩为100%设定

C4-05 启动力矩时间 (TorqCmp Delay T)	X	X	X	A	X

取值

0~200 ★[10]

功能

起动力矩量的上升过程时间,以ms为单位设定

选择说明

使用本功能场合,起动力矩补偿量用通常机械的磨擦负载来设定,行车等升降机,则用载重量来设定。磨擦负载:在C4-03,C4-04都设定为磨擦量
升降机:仅电动(卷上)侧设定为载重量。(有配重的升降机,由于再生负载而发生冲击,本功能请勿使用)。仅电动侧的补偿,正转/反转都可以设定。(再生侧则不能设定)速度搜索后,正转/反转切换时,起动力矩补偿将无效。使用第2电机时,起动力矩补偿无效的。起动时发生冲击场合,请增大起动力矩补偿时间参数(C4-05)。
如果使用起动时直流制动(b2-03)及多功能接点输入的制动指令(设定值:60)则起动前请预先给电机建立磁场。使用起动时直流制动(b2-03),可以尽早地建立磁场。

5.3.5 载波频率:C6

C6-01 载波频率上限 (Carrier Freq Max)	X	B	B	B	B

取值

2.0~5.0 ★[7.0]

功能

载波频率的上限,以KHz为单位,载波频率增益按下图

C6-02 载波频率下限 (Carrier Freq Max)	X	A	A	X	X

取值

0.4~15.0 ★[7.0]

功能

载波频率的下限,以KHz为单位,载波频率增益按下图矢量控制模式

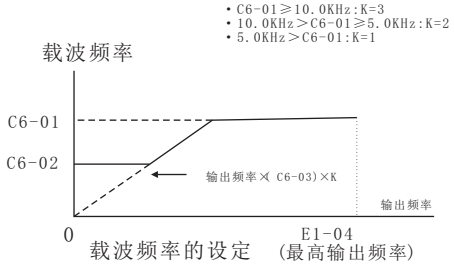
C6-03 载波频率增益 (Carrier Gain)	X	A	A	X	X

取值

00~99 ★[00]

功能

载波频率的上限和下限,以KHz为单位,载波频率增益按下图矢量控制模式,载波频率由参数C6-01(上限)固定(转下一页)



选择说明

根据控制方式,载波频率的特性有如下不同。无PGv/f控制,有PGv/f控制:可设定可变载波频率。无PG矢量控制,有PG矢量控制:载波频率一定(仅设定载波频率上限)。通常没有必要调整载波频率,如下场合时,请调整。
当变频器与电机之间的接线距离较长场合:请降低载波频率。
低速时速度及力矩振动较大场合:请降低载波频率。
＊1 变更控制方式。设定范围按如下变化:v/f控制(无PG/有PG):0.4~15.0;矢量控制(无PG/有PG):2.0~15.0
＊2 因变频器的功率,大小,出厂设定值而不同:矢量控制方式,载波频率由C6-01(载波频率上限)固定。v/f控制控制方式(无PG有PG),由载波频率下限(C6-02)和载波频率比例增益(C6-03),对应输出频率的可变载波频率。

★=出厂设定值

载波频率为一定场合C6-01和C6-02为同一值设定的话。请设定载波比例增益C6-03为"0"。载波频率固定在上限值。
如下设定时,为出错(OPE11：数据设定异常):载波频率上限(C6-01)＞5.0KHz且载波下限(C6-02)≤5.0KHz场合。载波频率比例增益(C6-03)＞6且(C6-01)＜(C6-02)场合。设定了下限值大于上限值场合,下限值被视作无效,载波频率固定在上限值。

5.3.6 乱调防止功能：C7

C7-01 乱调防止选择	X	A	A	X	X
(Hunt Prev Select)					

取值

无效 [0]
有效 ★ [1]

功能

防止乱调功能,是轻负载时抑制电机乱调的作用。是V/f控制方式的专用功能。比抑制振动更优先考虑高应答性时请设定乱调防止功能无效。

C7-02 乱调防止增益	X	A	A	X	X
(Hunt Prev Gain)					

取值

0.00~2.50 ★ [1.00]

功能

乱调防止增益的倍率设定

选择说明

轻负载时发生振动场合:请增大C7-02的设定值。太大的话电流被过分抑制,会成为失速状　。
相比抑制振动,高应答性应被优先考虑场合:请选择乱调防止功能无效(C7-01="0")

5.3.7 速度反馈检测:C8

C8-08 抑制增益	X	X	X	A	X
(AFR Gain)					

取值

0.00～10.00 ★ [1.00]

功能

内部速度反馈检出控制部的增益,用倍率设定。

选择说明

通常没有必要调整。电机的旋转不稳定(发生乱调)情况,力矩、速度的应答性低下时，按如下作微调整:发生乱调情况:请增大设值,一边确认应答性,一边以0.05数值增加。
应答性低下情况:请减小设定值,一边确认应答性,一边以0.05数值减小。

C8-09 抑制时间	X	X	X	A	X
(AFR Time)					

取值

0~2000 ★ [50]

功能

内部速度反馈检出控制部的增益,用倍率设定。

C8-30 载波频率	X	X	X	A	A
(Carrier in tune)					

取值

2KHz [0]
C6-01 ★ [1]
5 KHz(400V级18.5～55KW的变频器为2.5Hz) [2]

功能

内部速度反馈检出控制部的增益,用倍率设定。

5.4: 指令关系(d)的参数

5.4.1 频率指令:d1

d1-01 频率指令1	O	Q	Q	Q	Q
(Reference 1)					

取值

0~400.00 ★ [0.00]

功能

设定频率指令

d1-02 频率指令2	O	Q	Q	Q	Q
(Reference 2)					

取值

0~400.00 ★ [0.00]

功能

多功能输入"多段速指令1"为ON时的频率指令

d1-03 频率指令3	O	Q	Q	Q	Q
(Reference 3)					

取值

0~400.00 ★ [0.00]

功能

多功能输入"多段速指令2"为ON时的频率指令

d1-04 频率指令4	O	Q	Q	Q	Q
(Reference 4)					

取值

0~400.00 ★ [0.00]

功能

多功能输入"多段速指令1,2"为ON时的频率指令

d1-05 频率指令5	O	B	B	B	B
(Reference 4)					

取值

0~400.00 ★ [0.00]

功能

多功能输入"多段速指令3"为ON时的频率指令

d1-06 频率指令6	O	B	B	B	B
(Reference 6)					

取值

0~400.00 ★ [0.00]

功能

多功能输入"多段速指令1,3"为ON时的频率指令

d1-07 频率指令7	O	B	B	B	B
(Reference 7)					

取值

0~400.00 ★ [0.00]

功能

多功能输入"多段速指令2,3"为ON时的频率指令

d1-05 频率指令5	O	B	B	B	B
(Reference 4)					

取值

0~400.00 ★ [0.00]

功能

多功能输入"多段速指令3"为ON时的频率指令

d1-06 频率指令6	O	B	B	B	B
(Reference 6)					

取值

0~400.00 ★ [0.00]

★ =出厂设定值

功能

多功能输入"多段速指令1,3"为ON时的频率指令

d1-07	频率指令7	0	B	B	B	B
	(Reference 7)					
	取值					
0~400.00		★	[0.00]			

功能

多功能输入"多段速指令2,3"为ON时的频率指令

d1-08	频率指令8	0	B	B	B	B
	(Reference 8)					
	取值					
0~400.00		★	[0.00]			

功能

多功能输入"多段速指令1,2,3"为ON时的频率指令

d1-09	点动频率	0	Q	Q	Q	Q
	(Jog Reference)					
	取值					
0~400.00		★	[6.00]			

功能

多功能输入"点动频率选择","FJOG指令","RJOG"为On时的频率指令。

选择说明

频率指令的设定值的单位,按照o1-03(频率指令设定/表示的单位)所设定的单位。频率指令的初始值,随o1-03的变更而同时被变更。

例如:频率指令1已设定在6.00Hz状 ,当o1-03设定为"1"(0.01%单位)时,则频率指令1的设定值为10.00%。使用频率指令2～8场合,请在多功能输入(H0-01～H1-06)设定多段速指令1～3。使用JOG功能场合,请设定点动频率指令(d1-09)。从外部端子JOG功能场合,请在多功能输入(H1-01～H1-06)设定电动频率,选择FJOG或RJOG。使用从操作器只进行JOG运行场合,不要设定多功能输入。

5.4.2 频率上限、下限:d2

d2-01	频率上限	X	B	B	B	B
	(Ref Upper Limit)					
	取值					
0.0~110.0		★	[100.0]			

功能

输出频率上限值,以最高输出频率为100%,以%为单位设定

d2-02	频率下限	X	B	B	B	B
	(Ref Lower Limit)					
	取值					
0.0~109.0		★	[0.0]			

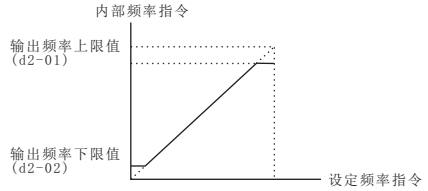
功能

输出频率的下限值,以最高输出频率为100%,以%为单位设定

选择说明

频率指令为零时给运行指令的话,即按频率指令下限值 (d2-02)运行。但是下限值小于最低输出频率(E1-09)场合,则不运行。

输出频率的上限值、下限值,以最高输出频率作为100%,按%单位设定。频率指令极限值的上下限值如图所示。



频率指令极限的上、下限值

5.4.3 跳跃频率:d3

d3-01	跳跃频率1	X	B	B	B	B
	(Jump Freq 1)					
	取值					
0~400.00		★	[0.0]			

功能

设定欲禁止的频率中心值,以Hz为单位

d3-02	跳跃频率2	X	B	B	B	B
	(Jump Freq 2)					
	取值					
0~400.00		★	[0.0]			

功能

设定欲禁止的频率中心值,以Hz为单位

d3-03	跳跃频率3	X	B	B	B	B
	(Jump Freq 3)					
	取值					
0~400.00		★	[0.0]			

功能

设定欲禁止的频率中心值,以Hz为单位

d3-04	跳跃幅宽	X	B	B	B	B
	(Jump Bandwidth)					
	取值					
0.0~20.0		★	[1.0]			

功能

设定欲禁止频率的频率范围,以Hz为单位设定。由(设定禁止频率±d3-04) 来设定禁止范围。

选择说明

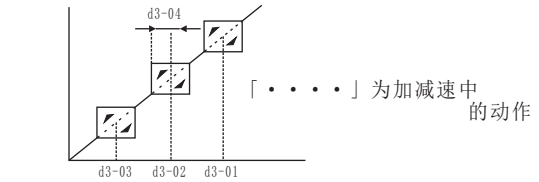
在变频器的输出频率范围内有机械共振频率场合,避开这个频率运行,可以防止共振。对设定频率指令的不响应带也有效。

设定禁止频率(d3-01~d3-03)为0.0Hz,频率跳跃功能不动作。d3-01~d3-03,请设定禁止频率的中心值,并一定要d3-03≤d3-02≤d3-01。

d3-04,请设定禁止频率的幅宽[设定禁止频率±设定禁止频率幅宽]作为设定禁止频率的范围。

在设定禁止频率的范围,运行受到禁止,但加减速中不禁止而是平滑地变化。

内部频率指令和设定频率指令的关系如图所示



设定禁止频率

★=出厂设定值

5.4.4 频率指令保持:d4

d4-01 频率保持选择 (MOP Ref Memory)	X	A	A	A	A

取值

无效(运行停止,电源投入后的再起动0HZ起动 ★[0]
有效(运行停止,电源投入后的再起动时,按前一次保持的频率运行) [1]

功能

设定保持中的频率指令是否需要记忆

选择说明

d4-01是在多功能输入(H1-01~H6-06)设定为如下场合时有效保持加减速停止(设定值:A),Up指令(设定值:10),DOWN指令(设定值:11)在这些外部信号处于保持时,请设定 输出频率是记忆还是不记忆,保持功能设定为有效场合,电源投入后,按所记忆的指令值再开始运行。
关于保持加减速停止及UP/DOWN指令,在[多功能输入的设定:H1]有详细说明。

d4-02 指令加减限制	X	A	A	A	A

取值

1~100 ★ [25]

功能

对模拟量频率指令进行加减算得出频率。以最高输出频率为100%,以%为单位设定。

选择说明

在多功能输入(H1-01~H6-06)已设定了+速度指令(设定值:1C)及-速度指令(设定值:1D)的场合,功能有效。当频率指令从模拟量输入时,+速度指令为ON时,模拟量频率指令与+,-速度极限(d4-02)加算后作为输出频率。-速度指令为ON时则减算。以最高输出频率100%,以%单位设定。
负速度指令为ON,减算后的结果低于零时,输出频率为零。关于正速度指令/负速度指令,请详见[多功能输入的设定:H1]的说明。

5.5: 电机参数(E)的参数

5.5.1 V/f特性:E1

E1-01 输入电压设定 (Input Voltage)	X	Q	Q	Q	Q

取值

155~460VAC ★ [400VAC]

功能

变频器的输入电压,用V为单位设定

选择说明

以1V为单位设定变频器的输入电压,这个设定值作为保护功能等的基准值。请配合电源电压设定输入电压(E1-01)

E1-02 电机种类选择 (Motor Selection)	X	Q	Q	Q	Q

取值

标准电机(通用电机) ★ [0]
变频电机 [1]
矢量专用电机 [2]

功能

电机选择(电机保护过热)

选择说明

设定使用电机的种类,作为电机过热保护的基准。

E1-03 V/f曲线选择 (v/f Selection)	X	Q	Q	X	X

取值

可选择15种固定的v/f曲线 [0]
任意v/f曲线 ★ [F]

功能

设定v/f曲线

选择说明

V/f曲线的设定方法以大致按以下2大类。从预先设定好的15种曲线(设定值:0~E)中选择1种和设定任意V/f曲线(设定值:F)。E1-03的出厂设定为"F"(任意V/f曲线) 内容与E1-03=1相同

5.5: 电机参数(E)的参数

5.5.1 V/f特性:E1

E1-01 输入电压设定 (Input Voltage)	X	Q	Q	Q	Q

取值

155~460VAC ★ [400VAC]

功能

变频器的输入电压,用V为单位设定

选择说明

以1V为单位设定变频器的输入电压,这个设定值作为保护功能等的基准值。请配合电源电压设定输入电压(E1-01)

E1-02 电机种类选择 (Motor Selection)	X	Q	Q	Q	Q

取值

标准电机(通用电机) ★ [0]
变频电机 [1]
矢量专用电机 [2]

功能

电机选择(电机保护过热)

选择说明

设定使用电机的种类,作为电机过热保护的基准。

E1-03 V/f曲线选择 (v/f Selection)	X	Q	Q	X	X

取值

可选择15种固定的v/f曲线 ★ [4]
任意v/f曲线 [F]

功能

设定v/f曲线

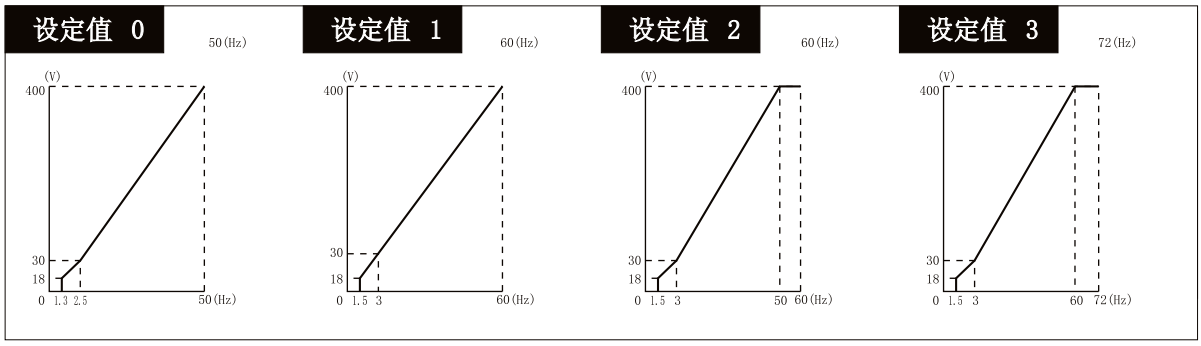
选择说明

V/f曲线的设定方法以大致按以下2大类。从预先设定好的15种曲线(设定值:0~E)中选择1种和设定任意V/f曲线(设定值:F)。E1-03的出厂设定为"F"(任意V/f曲线) 内容与E1-03=1相同

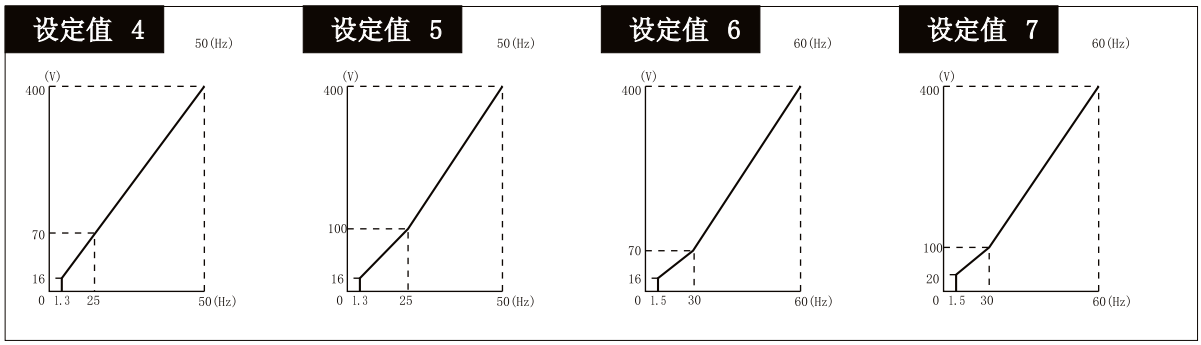
★=出厂设定值

1.5KW的v/f曲线

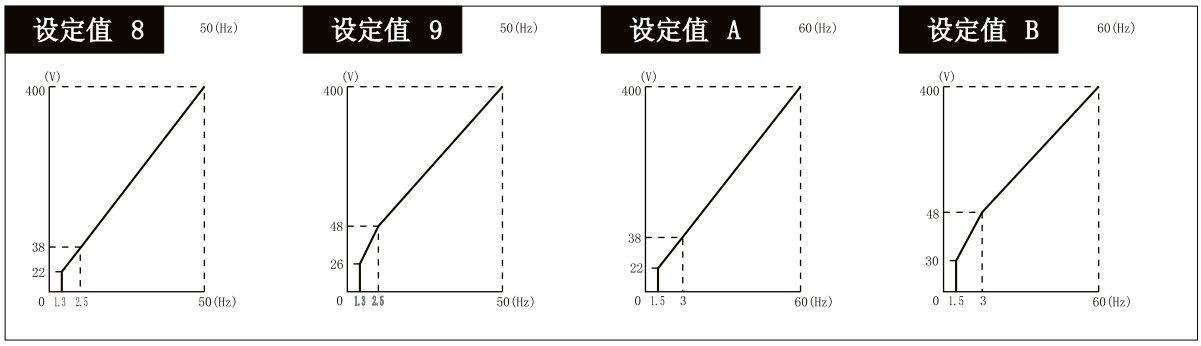
●恒力矩特性(设定值0-3)



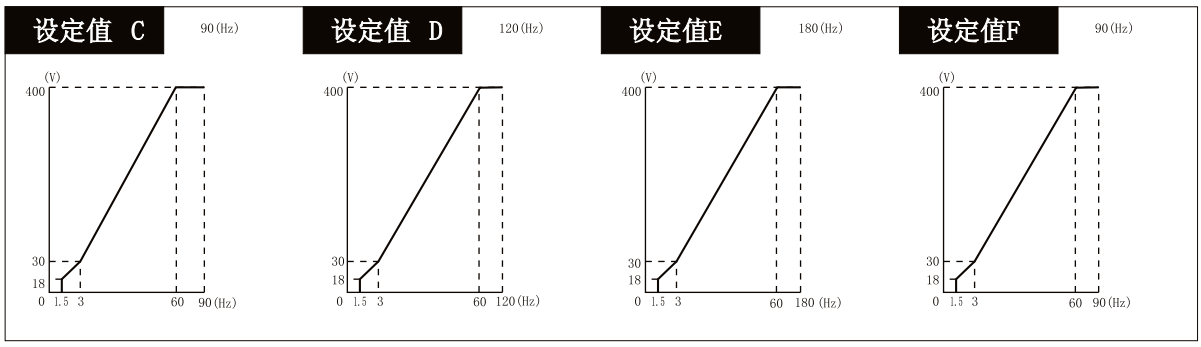
●递减力矩特性(设定值4-7)



●高起动力矩(设定值8-b)



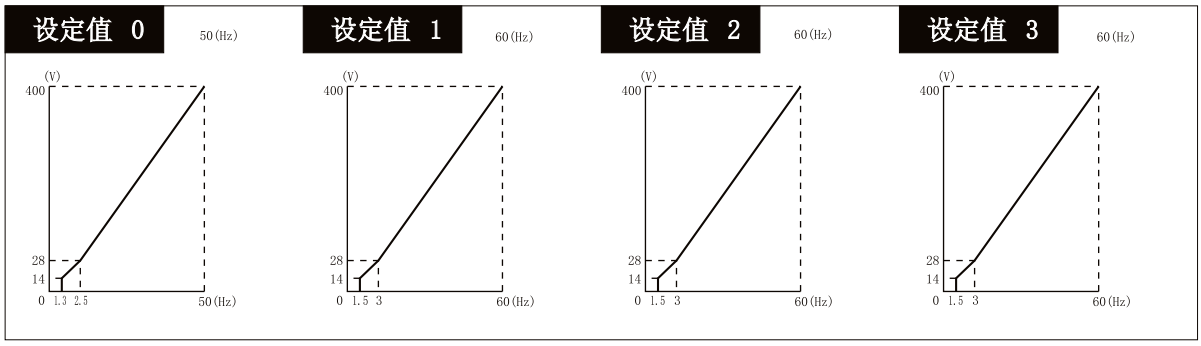
●输出恒功率运行(设定值C-E)



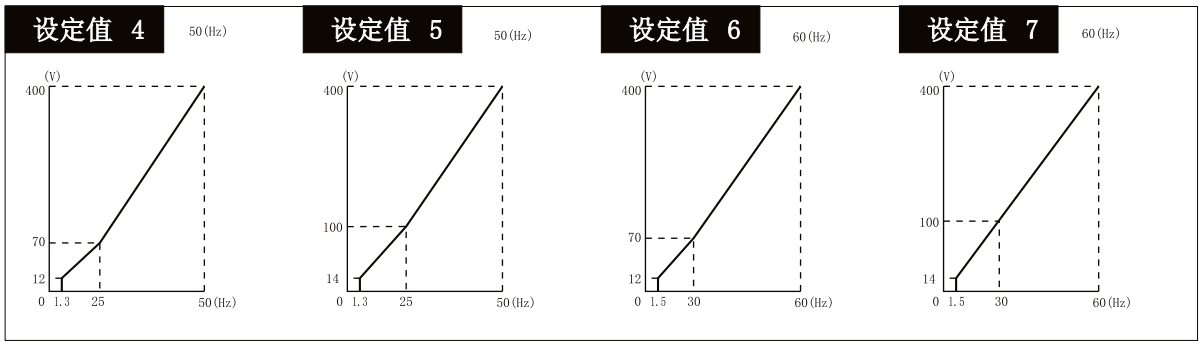
★ =出厂设定值

2.2-45KW的v/f曲线

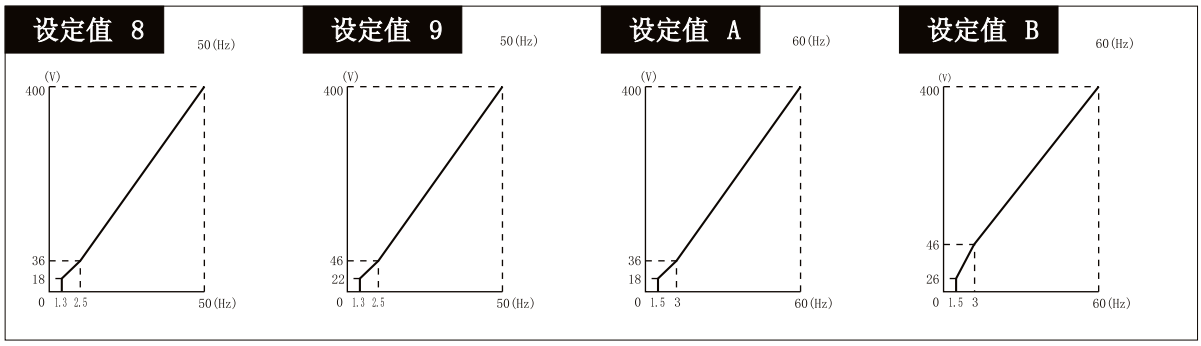
●恒力矩特性(设定值0-3)



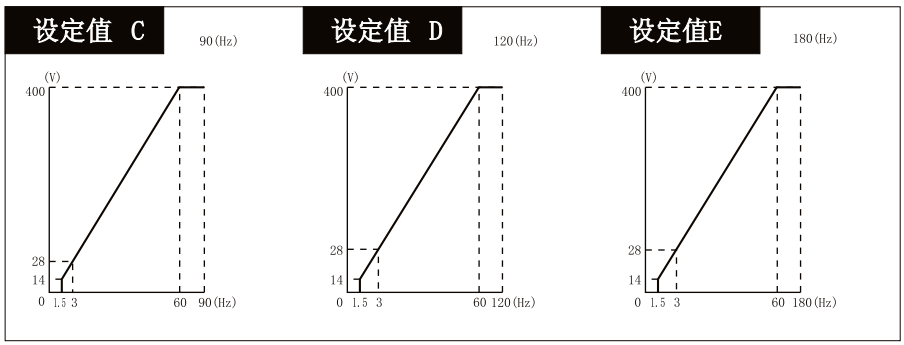
●递减力矩特性(设定值4-7)



●高起动力矩(设定值8-b)



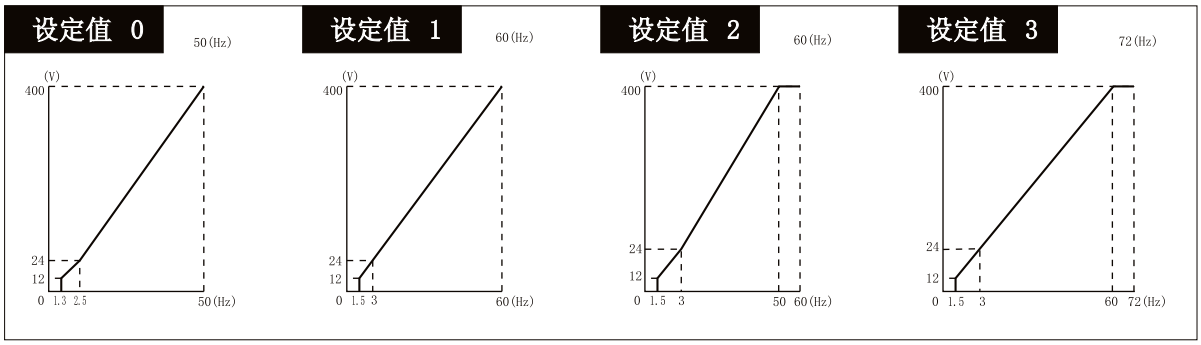
●输出恒功率运行(设定值C-E)



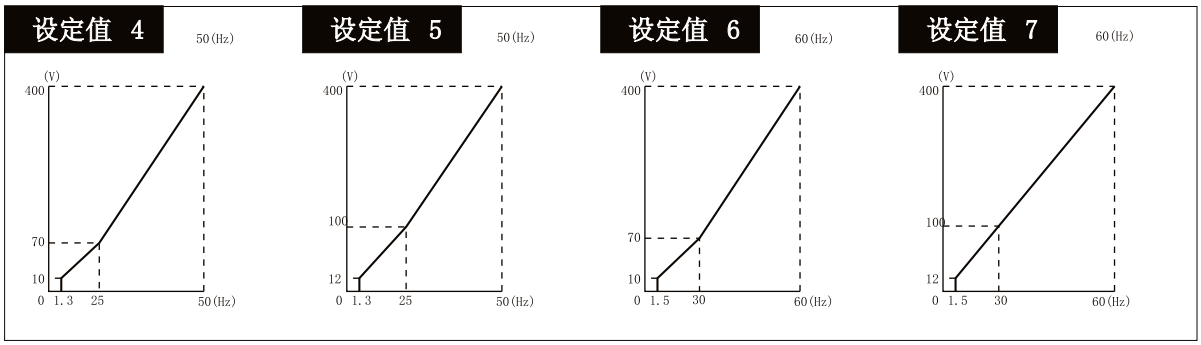
★=出厂设定值

55KW以上的v/f曲线

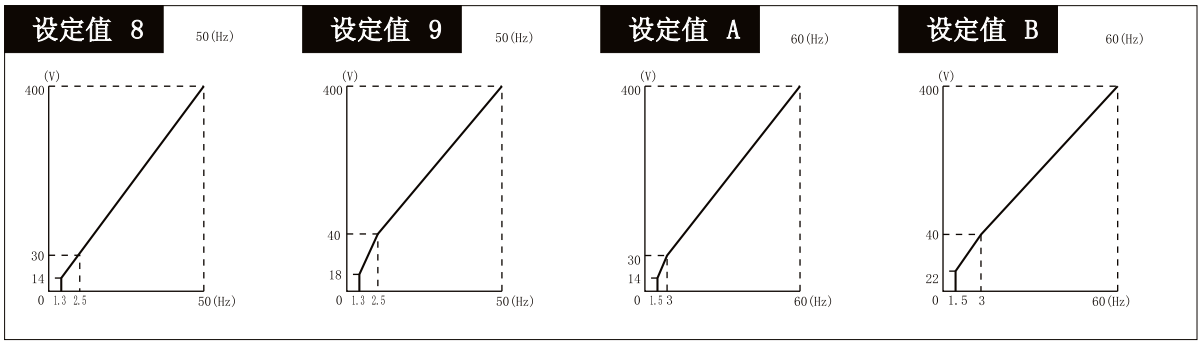
●恒力矩特性(设定值0-3)



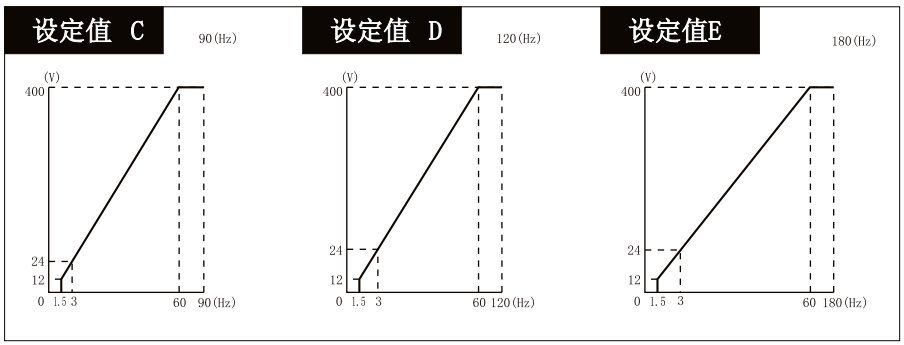
●递减力矩特性(设定值4-7)



●高起动力矩(设定值8-b)



●恒功率运行(设定值C-E)



★ =出厂设定值

E1-04 最高输出频率 (Max Frequency)	X	Q	Q	Q	Q

取值

40.0~400.0 ★ [60.0]

功能

设定v/f曲线

E1-05 最大输出电压 (Max Voltage)	X	Q	Q	Q	Q

取值

0.0~510.0 ★[400.0]

功能

设定v/f曲线

E1-06 基频(FA) (Base Frequency)	X	Q	Q	Q	Q

取值

0.0~400.0 ★[60.0]

功能

设定v/f曲线

E1-07 中间输出频率(FB) (Mid Frequency A)	X	Q	Q	A	X

取值

0.0~400.0 ★ [3.0]

功能

设定v/f曲线

E1-08 中间输出电压(VC) (Mid Voltage A)	X	Q	Q	A	X

取值

0.0~510.0 ★ [22.0]

功能

设定v/f曲线

E1-09 最低输出频率(FMIN) (Min Frequency)	X	Q	Q	Q	Q

取值

0.0~400.0 ★ [0.5]

功能

设定v/f曲线

E1-10 最低输出电压(FMIN) (Min Voltage)	X	Q	Q	Q	A

取值

0.0~510.0 ★ [4.0]

功能

设定v/f曲线

E1-11 中间频率2 (Mid Frequency B)	X	A	A	A	A

取值

0.0~400.0 ★ [0.0]

功能

通常没有必要设定。

E1-12 中间输出电压 (2 (VC))	X	A	A	A	A

取值

0.0~510.0 ★ [0.0]

功能

通常没有必要设定。

E1-13 基本电压 (Base Voltage)	X	A	A	Q	Q

取值

0.0~510.0 ★[0.0]

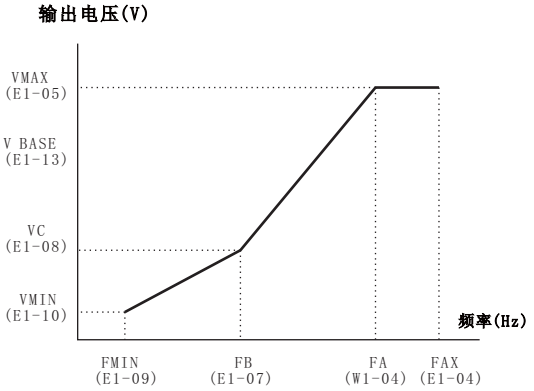
功能

通常没有必要设定。

选择说明

设定了E1-03="F"场合,则可设定E1-04~E1-10参数,"F"以外的设定,仅供查看。V/f特性为直线场合,E1-07(中间输出频率)和E1-09(最低频率),请设定为同一值。此时将与E1-08(中间输出频率电压无关)。

E1-04(FMAX)>=E1-06(FA)>E1-07(FB)>=E1-09(FMIN)



任意V/f曲线

5.5.2 电机参数:E2

E2-01 电机额定电流 (Motor Rated FLA)	X	Q	Q	Q	Q

取值

根据电机容量而定 ★

功能

电机额定电流,用A为单位设定

选择说明

请设定在电机铭牌上记载的电机额定电流。

E2-02 电机额定滑差 (motor Rated Slip)	X	A	A	Q	Q

取值

0.00~20.00 ★

功能

电机额定滑差量,以Hz为单位设定

选择说明

作为电机的滑差补偿功能的基准值。
出厂设定根据变频器功率有所不同。可以电机铭牌上记载的数值计算出电机额定滑差,并设定。
电机额定滑差量=
电机额定频率-额定转速×电机极数/120。

E2-03 电机空载电流 (no-load Current)	X	A	A	Q	Q

取值

根据电机容量而定 ★

功能

★ =出厂设定值

电机空载电流,以A为单位设定

选择说明

作为电机的滑差补偿功能的基准值。出厂设定根据变频器功率有所不同。请设定在额定电压,额定频率时的电机空载电流,如电机铭牌上没有记载,请向电机制造厂询问。

E2-04 电机极数	X X Q X Q
number Of Poles	

取值

2~48 ★ [4]

功能

电机极数设定

选择说明

请设定在电机铭牌上被记载的电机极数(POLE数)

E2-05 电机线间电	X A A A A
term Resistance	

取值

0.000~65.000 ★

功能

电机线间电阻 ,以Ω为单位设定

选择说明

作为电机的力矩补偿功能的基准值。出厂设置根据变频器功率大小而不同。请设定电机的线间的电阻(U-V,V-W,W-U)如电机铭牌上没有记载。请向电机制造厂询问。

E2-06 电机漏电	X X X A A
leak Inductance	

取值

0.0~40.0 ★

功能

由电机漏电抗而引起的电压降,相比电机的额定电压用%来设定。

选择说明

出厂设定值根据变频器的容量而不同。与电机漏电感引起的电压降相比,电机额定电压的%作为设定值。通常运行中的变频器自动补偿,因此没有必要设定。如电机的铭牌上没有记载,请向电机制造厂家询问,电机漏电感引起损失量以%值表示也可以。

E2-07 铁饱系数1	X X X A A
Saturation Comp 1	

取值

0.00~0.50 ★ [0.50]

功能

磁通量50%时的铁心饱和系数设定

E2-08 铁饱系数2	X X X A A
Saturation Comp 2	

取值

0.00~0.75 ★[0.75]

功能

磁通量75%时的铁心饱和系数设定

选择说明

这些参数,如果电机使用在额定频率以内,没有设定的必要。电机使用在高于额定频率以上范围时,请按如下值定(恒功率输出控制用)。

电机铁心饱和系数1:磁通量50%时的铁心饱和系数。电机铁心饱和系数2:磁通量75%时的铁心饱和系数。电机铭牌上并没有记载,请向电机制造厂咨询,按初始值设定不变也可。

E2-09 电机机械损失	X X X X A
Mechanical Loss	

取值

0.0~10.0 ★ [0.0]

功能

电机的机械损失,以电机的额定输出功率(W)作为100%,以%为单位设定。

选择说明

通常没有必要变更,如下场合请调整。由于轴承使电机的力矩损失较大时,使用在风机、 水泵、力矩损失较大时,以电机额定输出功率为100%,以%单位设定。被设定的机械损失,由力矩来补偿。

E2-10 力矩补偿铁损	X A A X A
Tcomp Iron Lose	

取值

0~6553.5 ★不同功率而不同

功能

电机铁损以W为单位设定

选择说明

出厂设定值根据变频器功率大小而不同。电机铁损以[W]为单位。通常没有必要设定。但是变频器的功率与电机功率相差很大时,请设定适用电机功率与变频器功率相同的值。

5.5.3 电机2模式:E3

E3-01 控制方式选择	X A A A A
Control Method	

取值

V/f控制 ★[0]
无PG矢量控制 [2]

5.5.4 电机2的V/f特性:E4

E4-01 最高输出频率	X A A A A
V/F2 Max Freq	

取值

40.0~400.0 ★[60.0]

功能

设定v/f曲线

E4-02 最大输出电压	X A A A A
V/F2max Voltage	

取值

0.0~510.0 ★ [400]

功能

设定v/f 曲线

★=出厂设定值

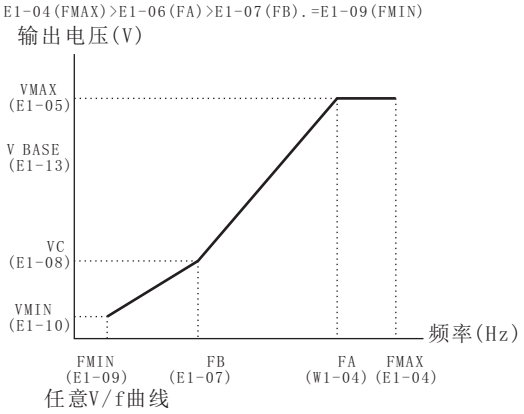
E4-03 基频 X A A A A
(V/F2 Base Freq)
取值
0.0~400.0 ★ [60]
功能
设定v/f 曲线

E4-04 中间输出频率 X A A A X
(V/F 2 Mid Freq)
取值
0.0~400.0 ★[3.0]
功能
设定v/f 曲线
选择说明
设定了E1-03="F"场合,则可设定E1-04~E1-10参数,"F"以外的设定,仅供查看。V/f特性为直线场合,E1-07(中间输出频率)和E1-09(最低频率),请设定为同一值。此时将与E1-08(中间输出频率电压)无关。

E4-05 最低输出电压 X A A A X
(V/F2 Mid Voltage)
取值
0.0~510.0 ★[22.0]
功能
设定v/f曲线
选择说明
设定了E1-03="F"场合,则可设定E1-04~E1-10参数,"F"以外的设定,仅供查看。V/f特性为直线场合,E1-07(中间输出频率) 和E1-09(最低频率)请设定为同值,此时将与E1-08(中间输出频率电压)无关。

E4-06 最低输出频率 X A A A A
(V/F2 Mid Freq)
取值
0.0~400.0 ★[0.5]
功能
设定v/f曲线
选择说明
设定了E1-03="F"场合,则可 设定E1-04~E1-10参数,"F"以外的设定,仅供查看。V/f特性为直线场合,E1- 07(中间输出频率)和E1-09(最低频率)请设定为同一值。此时将与视E1-08(中间输出频率电压)无关。

E4-07 最低输出电压 X A A A X
(Min Voltage)
取值
0.0~510.0 ★ [4.0]
功能
设定v/f曲线
选择说明
设定了E1-03="F"场合,则可设定E1-04~E1-10参数,"F"以外的设定,仅供查看。V/f特性为直线场合,E1-07(中间输出频率)和E1-09(最低频率)请设定为同一值。此时将与E1-08(中间输出频率电压)无关。 (转右图)



任意V/f曲线

5.5.5 电机2的参数:E5

E5-01 电机额定电流 X A A A A
(Motor2 rated FLA)
取值
根据电机容量不同而不同 ★
功能
电机额定电流,以A为单位设定
选择说明
设定范围为变频器额定电流的10~200%出厂设定根据变频器功率大小不同而有所不同,显示的值为200V级0.4KW的变频器的值.请按电机铭牌上记载的额定电流值设定。

E5-02 电机额定滑差 X A A A A
(Motor2 Liip Freq)
取值
0.00~20.00 ★
功能
电机额定滑差量,用Hz为单位设定
选择说明
出厂设定值根据变频器功率大小不同而有所不同,显示的值为200V级0.4KW变频器的值。从电机铭牌上记 载的数值,计算电机额定滑差, 并设定。电机额定滑差量=电机额定频率-额定转速X电机级数/120

E5-03 电机空载电流 X A A A A
(Motor2 No-load 1q)
取值
根据电机容量不同而不同 ★
功能
电机空载电流,以A为单位设定
选择说明
出厂设定变频器的功率大小而异。请设定电机在额定电压额定频率时的空载电流。通常在电机铭牌上没有记载,请向电机制造厂家询问。

E5-04 电机极数 X X A X A
(Motor2 # Poles)
取值
2~48 ★[4]
功能
电机极数设定
选择说明
请按在电机铭牌上被记载的电机极数(pole数)设定。

★ =出厂设定值

E5-05 电机线间电阻	X	A	A	A	A
(Motor2 trem Ohms)					

取值

0.000~65.000 ★

功能

电机线间电阻,以Ω为单位设定

选择说明

出厂设定因变频器的功率大小而异.请设定电机的线间电阻(U-V,V-W,W-U间).通常电机的铭牌上没有被记载,线间电阻值请向电机制造厂询问,可从测试报告的线间电阻值,根据下式计算,后设定。

E种绝缘:

测试报告的75°C时的线间电阻值(Ω)X0.92(Ω)

B种绝缘:

测试报告的75°C时的线间电阻值(Ω)X0.92(Ω)

F种绝缘:

测试报告的115°C时的线间电阻值(Ω)X0.87(Ω)

E5-06 电机漏电阻	X	X	X	A	A
(Motor 2 Leak)					

取值

0.0-40.0 ★

功能

由电机漏电抗而引起的电压降,相比电机的额定电压用%来设定。

选择说明

出厂设定值根据变频器的容量而不同。由电机漏电感引起的电压降相比电机额定电压的%作为设定值。通常运行中的变频器自动补偿,因此没有必要设定。电机的铭牌上没有记载,可以向电机制造厂家询问,由漏电感引起损失量以%值表示也可以。

5.6:外部端子(H)的参数

5.6.1 多功能输入:H1

H1-01 端子3功能选择	X	B	B	B	B
(Terminal 3 Sel)					

取值

0~77 ★ [24]

功能

多功能输入1:端子3的功能选择

选择说明

参考以下说明

H1-02 端子4功能选择	X	B	B	B	B
(Terminal 4 Sel)					

取值

0~77 ★ [14]

功能

多功能输入2:端子4的功能选择

选择说明

参考以下说明

H1-03 端子5功能选择	X	B	B	B	B
(Terminal 5 Sel)					

取值

0~77 ★[3(0)]

功能

多功能输入3:端子5的功能选择

选择说明

参考以下说明

H1-04 端子6功能选择	X	B	B	B	B
(Terminal 6 Sel)					

取值

0~77 ★ [4(3)]

功能

多功能输入4:端子6的功能选择

选择说明

参考以下说明

H1-05 端子7功能选择	X	B	B	B	B
(Terminal 7 Sel)					

取值

0~77 ★[6(4)]

功能

多功能输入5:端子7的功能选择

选择说明

参考以下说明

H1-06 端子8功能选择	X	B	B	B	B
(Terminal 8 Sel)					

取值

0~77 ★ [8(6)]

功能

多功能输入6:端子8的功能选择

选择说明

参考以下说明

★=出厂设定值

关于外部端子功能的设定和内容

■ **多功能输入的设定:1**

下表所示多功能输入的设定、功能

多功能输入一览

设定值	功能	控制方式			
		无PGV/f	有PGV/f	无PG矢量	有PG矢量
0	3线制(正转/反转指令)	○	○	○	○
1	LOCAL/REMOTE 选择(ON:操作器,OFF:参数设定)	○	○	○	○
2	选项卡/变频器本体选择(ON、选项卡)	○	○	○	○
3	多段速指令1 当H3-05设为"0"时,此功能兼用于"主/辅速切换"	○	○	○	○
4	多段速指令2	○	○	○	○
5	多段速指令3	○	○	○	○
6	点动(JOG)频率选择(比多段速优先)	○	○	○	○
7	加速时间选择1	○	○	○	○
8	基极封锁指令NO(a接点:ON时基极封锁)	○	○	○	○
9	基极封锁指令NC(b接点:OFF时基极封锁)	○	○	○	○
A	保持加减速停止(ON时停止加减速、保持频率)	○	○	○	○
B	变频器过热预告OH2(ON时表示OH2)	○	○	○	○
C	多功能模拟量输入选择(ON时多功能输入有效)	○	○	○	○
E	速度控制积分复位(ON时积分控制无效)	X	○	X	—
F	未使用(请勿设定)	—	—	—	—
10	UP指令(请务必与DOWN同时设定)	○	○	○	○
11	DOWN指令(请务必与UP同时设定)	○	○	○	○
12	FJOG(ON:点动频率d1-09正转运行)	○	○	○	○
13	RJOG(ON:点动频率d1-09反转运行)	○	○	○	○
14	故障复位(ON的上升沿时复位)	○	○	○	○
15	非常停止 (A接点:ON的时非常停止时间C1-09减速停止)	○	○	○	○
16	电机切换指令(2电机选择)	○	○	○	○
17	非常停止(b接点:OFF的时非常停止时间C1-09减速停止)	○	○	○	○
18	计时功能输入(b4-01,b4-02功能设定,与计时功能输出同时设定)	○	○	○	○
19	取消PID控制(ON:PIF控制无效)	○	○	○	○
1A	加减速时间选择2	○	○	○	○
1B	参数写入许可(ON:参数写入可,OFF:除频率监视外,参数写入禁止)	○	○	○	○
1C	+速度指令(ON:d4-02的频率与模拟量指令加算)	○	○	○	○
1D	-速度指令(ON:d4-02的频率与模拟量指令加算)	○	○	○	○
1E	模拟量频率指令的采样/保持	○	○	○	○
1F	频率指令端子113/14选择(ON:选择端子14),H3-09=1F时有效	○	○	○	○
20~2F	外部故障(可任意设定) 输入方式:A接点/B接点 检出方式:常时/运行中 停止方式:减速停止/自由滑行/非常停止/继续运行	○	○	○	○
30	PID控制积分复位(ON:积分复位)	○	○	○	○
31	PID控制积分复位(ON:积分保持)	○	○	○	○
60	直流制动指令(ON直流制动动作)	○	○	○	○
61	外部搜索指令1:最高输出频率(ON:速度搜索)	○	X	○	X
62	外部搜索指令2:设定频率(ON:速度搜索)	○	X	○	X
63	节能指令(ON:由b8-01,b8-02设定节能控制)	○	○	X	X
64	外部搜索指令3(从VS-656DCS的动作中信号取得)	○	○	○	○
65	KEB(瞬停时减速运行)指令(b接点)	○	○	○	○
66	KEB(瞬停时减速运行)指令(a接点)	○	○	○	○
71	速度/力矩控制切换(ON:力矩控制)	X	X	X	○
77	速度控制(ASR)比例增益切换(ON:C5-03 OFF:C5-01,C5-03,C5-07决定增益)	X	X	X	○

★ =出厂设定值

- 出厂设定的( )内的数值,表示在3线制的初始值。
- 下表列出了一些常用功能的设定。

功能	设定值
3线制(正转/反转指令)	0
多段速指令1-3/点动频率选择	3~6
加减速时间选择1.2	7.1A
非常停止	15
FJOG指令/RGJOG 指令	12, 13
选择频率指令端子13/端子14	1F
计时功能输入	18
节能指令	63

面板/远距离选择(设定值:1)

OFF	实行频率指令的选择(b1-01),运行指令的选择(b1-02)的设定。
ON	用数字操作器设定频率指令/运行指令。

- 可以切换频率指令/运行指令的输入方法。
- 只有在变频率器停止状态才能切换。
- 一旦设定了这个功能,数字操作器的运行方法选择键(LOCAL/REMOTE)便无效了。

选择卡/变频器选择(设定值:2)

OFF	变频器的频率指令有效
ON	选择卡的频率指令有效

- 从变频器本体,或选项卡输入的频率指令,其中哪一个有效都可以切换。但只有在变频器停止状态才能切换。
- 请设定频率指令的选择(b1-01)为"0"(操作器)或"1"(外部端子的模拟量输入)的其中一个.设定为"3"(选项卡)的场合,只有选项卡的频率指令有效。

基极锁定指令NO(设定值:8)

OFF	通常的运行
ON	基极锁定

■ 多功能输入的设定:H1-01~H1-06

- 进行端子3~8的功能选择,请配合运行设定多功能输入1~6

参数NO	名称	运行中的改变	设定范围	单位	出厂时设定	存取级别	
						无PG V/f	无PG 矢量
H1-01	多功能输入1 (端子3的功能选择)	X	0~77	—	24	B	B
H1-02	多功能输入2 (端子4的功能选择)	X	0~77	—	14	B	B
H1-03	多功能输入3 (端子5的功能选择)	X	0~77	—	3(0)	B	B
H1-04	多功能输入4 (端子6的功能选择)	X	0~77	—	4(3)	B	B
H1-05	多功能输入5 (端子7的功能选择)	X	0~77	—	6(4)	B	B
H1-06	多功能输入6 (端子8的功能选择)	X	0~77	—	8(6)	B	B

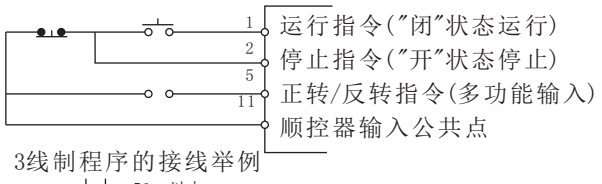
★ =出厂设定值

- 出厂时设定的（ ）内的数值,是表示用3线制初始化时的初始值。
- 在此,关于使用比较多的以下6项作说明。
- 3线制程序(正转/反转指令): 设定值 0
- 多段速指令1~3/点动频率选择: 设定值 3~6
- 加减速时间选择1.2: 设定值 7，1A
- 非常停止: 设定值 15
- FJPG指令/RJOG指令: 设定值 12 ,13
- 频率指令端子13/端子14选择: 设定值 1F

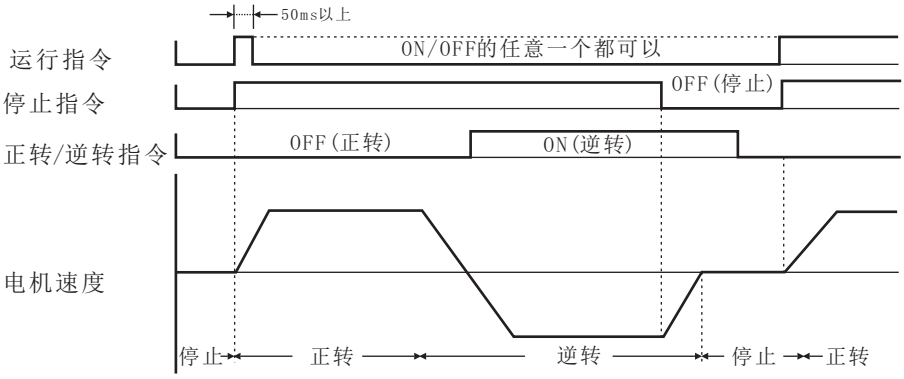
■ 3线制程序(正转/反转指令):设定值"0"

- 多功能输入1~6(H1-01~H1-06)的其中任意一个设定为"0",则3线制程序成立,这个被设定的多功能输入端子便成为正转/反转指令端子。
- 在初始化参数(A1-03)实行了3线制程序初始化场合,多功能输入3(端子5)便成为正转/反转指令的输入端子。

停止SW(b接点) 运行SW(a接点)



3线制程序的接线举例



3线制程序的时序图

■ 多段速指令1~3/点动频率选择:设定值"3"~"6"

- YD3000N,可使用8个频率指令和1个点动频率指令,由此,最高可9段速。
- 为了切换这些频率指令,请在多功能输入设定多段速指令1~3及点动频率选择。

端子	参数NO.	设定值	内 容
5	H1-03	3	多段速指令1(在多段机能模拟量输入H3-05中设定辅助频率指令时,也兼用于主速/辅助速的切换)
6	H1-04	4	多段速指令2
7	H1-05	5	多段速指令3
8	H1-06	6	点动(JOG)频率选择(较多段速指令优先)

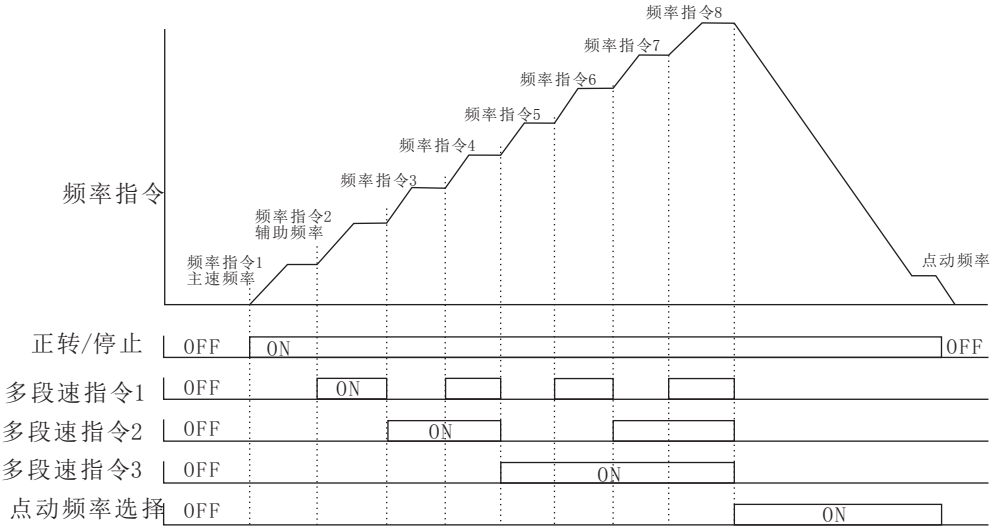
- 根据多段速指令1~3及点动频率选择的ON/OFF,被选择的频率,如下表所示。

★ =出厂设定值

端子5	端子6	端子	端子	被选择的频率
多段速指令1	多段速指令2	多段速指令	点动频率选择	
OFF	OFF	OFF	OFF	频率指令1 d1-01主速频率数
ON	OFF	OFF	OFF	频率指令2 d1-02辅助频率数
OFF	ON	OFF	OFF	频率指令3 d1-03
ON	ON	OFF	OFF	频率指令4 d1-04
OFF	OFF	ON	OFF	频率指令5 d1-05
ON	OFF	ON	OFF	频率指令6 d1-06
OFF	ON	ON	OFF	频率指令7 d1-07
ON	ON	ON	OFF	频率指令8 d1-08
—	—	—	ON	点动频率d1-09

「1段速」 「2段速」的频率指令的选择方法

- 使用主速频率指令场合(模拟量端子13或14),请设定b1-01=1
- 使用频率指令1(d1-01)场合,请设定b1-01=0
- 使用辅助频率指令(模拟量端子16)场合:请使用初始值,不用改变。
- 使用频率指令2(d1-02)场合:请设定H3-05=1F

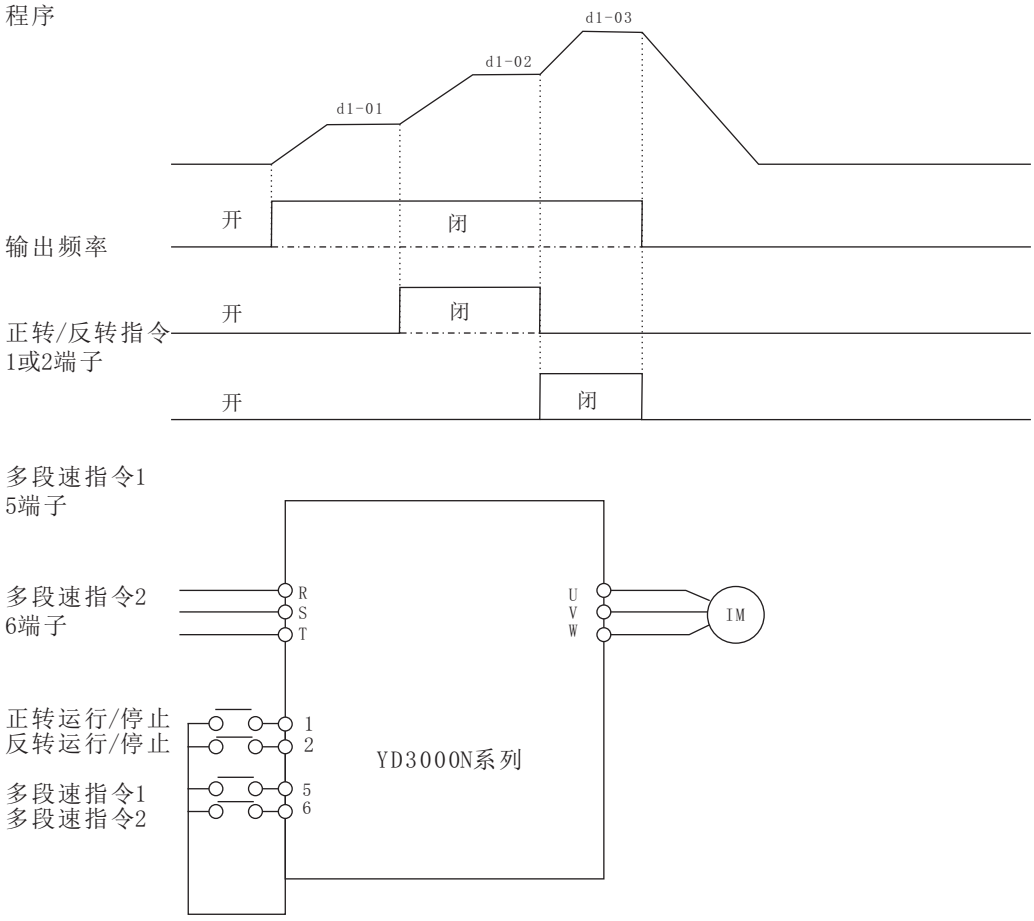


多段速指令/点动频率选择的时序图

★ =出厂设定值

3段速运行例

由变频器内的参数设定的频率进行3段速运行的例子



○11

• 参数设定

参数NO	名称	设定值
A1-01	参数的存取级别	3:BACIC (B)
b1-01	频率指令选择	0:操作器
d1-01	频率指令1	**Hz(设定频率)
d1-02	频率指令2	**Hz(设定频率)
d1-03	频率指令3	**Hz(设定频率)
H1-03	端子5的功能选择	3:多段速指令1(出厂设定)
H1-04	端子6的功能	4:多段速指令2(出厂设定)
H3-05	端子16的功能选择	1F:未使用

2段速的场合,则不要端子6。

★=出厂设定值

■ 加减速时间选择1,2:设定值"7","1A"

YD3000N的加速时间,减速时间可以各为4种,4个设定,为了切换这些加减速时间,请在多功能输入设定加减速时间选择1,2

设定值	内容
7	加减速时间选择1
1A	加减速时间选择2

- 根据加减速时间选择1,2的ON/OFF,被选择的加减速时间如下表所示。加减速时间,在运行中也可切换。

加减速时间选择1	加减速时间选择2	加速时间	减速时间
OFF或未设定	OFF或未设定	加速时间1 C1-01	减速时间1 C1-02
ON	OFF或未设定	加速时间2 C1-03	减速时间2 C1-04
OFF或未设定	ON	加速时间3 C1-05	减速时间3 C1-06
ON	ON	加速时间4 C1-07	减速时间4 C1-08

■ 非常停止:设定值"15","17"

- 设定了非常停止后,多功能输入为"ON"时,则按照C1-09(非常停止时间)所设定的减速时间减速停止。设定了这个功能场合，也请设定C1-09(非常停止时间)。
- 如要解除非常停止,则将运行指令OFF,并将非常停止也OFF
- 非常停止在b接点的场合,请设定为"17"

设定值	内容
15	非常停止(a接点:ON时按C1-09非常停止时间减速停止)
17	非常停止(b接点:OFF时按C1-09非常停止时间减速停止)

■ FJOG指令/RJOG指令:设定值"12""13"

可进行正转及反转的点动频率运行

设定值	内容
12	FJOG指令 ON:按点动频率(d1-09)正转运行
13	RJOG指令 ON:按点动频率(d1-09)反转运行

- FJOG指令及RJOG指令较其他的频率指令优先。
- FJOG指令和RJOG指令同时500 ms以上ON,则变频器按照b1-03(停止方法选择)的设定值停止运行。
- FJOG指令/RJOG指令无论只设定哪一方都可以的。
- 没有输入正转指令/反转指令则成为单独的运行状态。

■ 频率指令端子13/端子14:设定值"1F"

- 在多功能输入设定这个功能,则端子13或端子14运行可切换。

OFF	从端子13来的模拟量输入作为主速频率指令
ON	从端子14来的模拟量输入作为主速频率指令

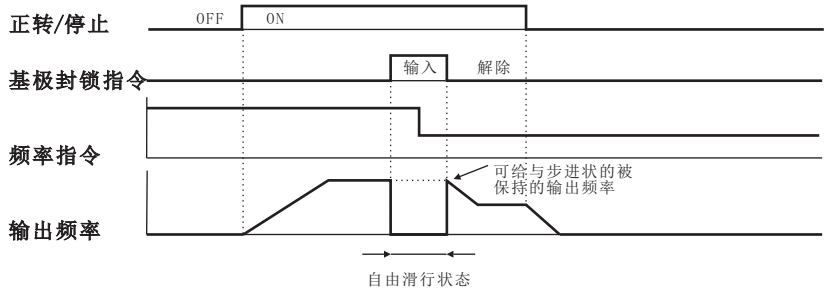
- 端子14作为频率指令使用场合,请在H3-09[频率指令(电流)端子14功能选择]设定为1F,如在H3-09不设定1F,而选择这个功能的话,便会出现设定出错(OPE03)。
- H3-09[频率指令(电流)端子14功能选择为"1F"(频率指令)，而多功能输入却不设定为"1F"(频率指令端子13/端子14选择),那么从端子13来的指令和从端子14来的指令经过加算后的值,作为主速频率指令值。

★=出厂设定值

基极封锁指令NC(设定值:9)

OFF	基极封锁
ON	通常的运行

- 是从外部指令基极封锁的功能
- 基极封锁,就是切断变频器的输出。基极封锁指令一旦输入,电机便处于自由滑行状态。
- 由于输出频率的值在内部被保存了。一旦解除基极锁定,这个频率便被输出。这时,由于输出频率呈步进式变化,所以特别在高速旋转状态被输入基极封锁指令的场合,应采取一些安全措施,如将运行指令置为OFF。运行指令被置OFF的话,内部被 保持的输出频率值便恢复到零。
- 输入基极封锁指令后,解除时,电压按电压复位时间(L2-04)复位。

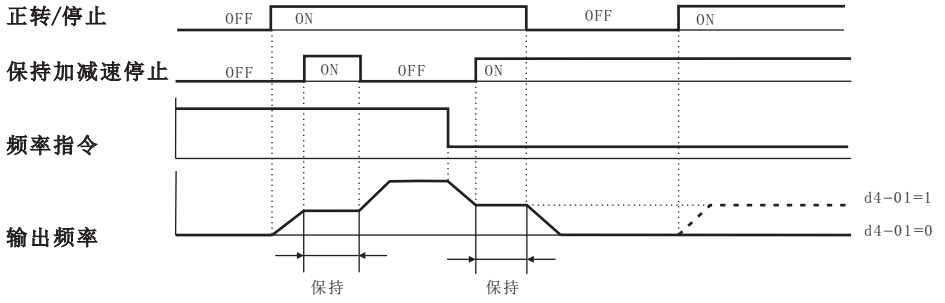


基极封锁指令

保持加减速停止(设定值:A)

OFF	正常运行或再开始加减速
ON	停止加减速, 保持频率

- 输入保持加减速停止期间,停止加减速,并保持那时的输出频率。
- 保持加减速停止被输入后,又被解除(OFF),则加减速再开始。
- 保持加减速停止已输入的状态下,输入了停止指令,则进入停止动作。
- d4-01(频率指令的保持功能选择)设定为"1"场合。保持频率被记忆了。由于这个值即使在电断后仍被记忆中,因此再次输入运行指令时,便按这个频率再开始运行。



加减速停止

- d4-01="1"场合,记忆了保持的输出频率。变频器停止后也要按这个频率运行场合,请在保持加减速停止为ON的状态下输入运行指令。
- d4-01="0"的场合,在加减速停止时ON的状态下输入运行指令,则输出频率为"零"被保持下来。

★ =出厂设定值

变频器过热报警OH2(设定值:B)

OFF	通常的运行
ON	通常的运行（在数字操作器上显示“OH2变频器过热报警”的警告）

- 在变频器过热报警为ON期间,显示"OH2变频器过热报警"的警告。改为OFF,则显示恢复到原来,不要进行报警复位操作。
- 变频器不进行故障检出,继续运行。请使用从周围温度传感器来的警告表示。

多功能模拟量输入选择(设定值:C)

OFF	多功能模拟量输入无效
ON	多功能模拟量输入有效

- 多功能模拟量输入的有效/无效,可用外部操作。
- 这个信号为OFF时,与在H3-05(多功能模拟量输入端子16功能选择)设定为"1F"(不使用模拟量输入)的动作是一样的。

有PGV/f无效速度控制选择(设定值:D)

OFF	有PGV/f控制(用速度反馈进行速度控制有效)的动作
ON	无PGV/f控制(用速度反馈进行速度控制无效)的动作

- 从外部可以切换有PG速度控制方式和无PG速度控制方式.变频器在运行中也可以切换.

速度控制积分复位(设定值:E)

OFF	在PI控制的速度控制　路动作
ON	在P控制的速度控制　路动作（速度控制的积分值，按积分时间参数被复位）

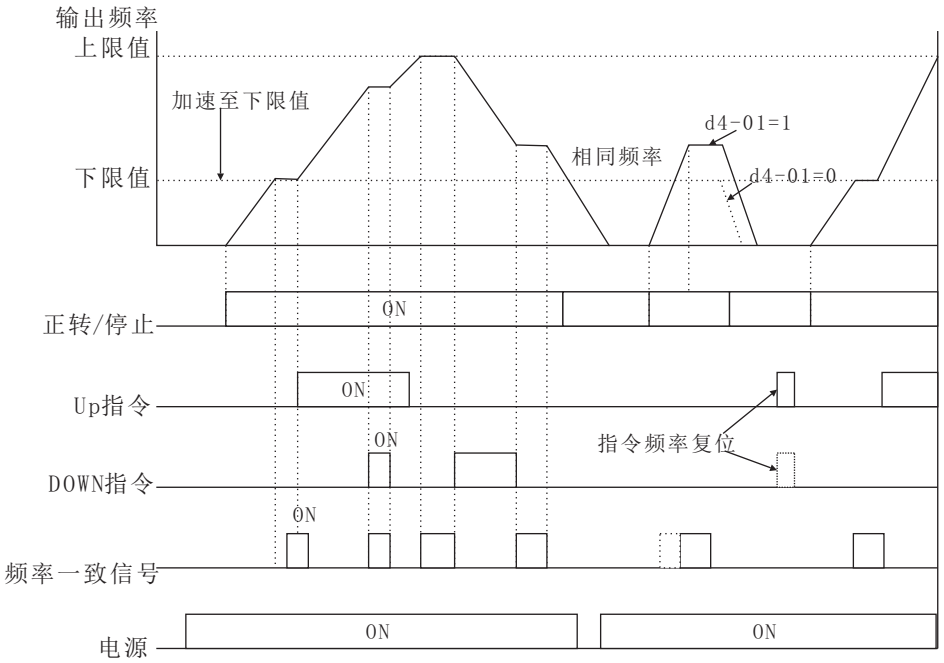
- 有PG V/f控制方式场合,这个功能只有在F1-07(加减速中的积分动作选择)为"0"(无效:加减速中积分不动作)的场合有效。
- 变频器在运行中也可切换。

UP指令(设定值:10)/DOWN指令(设定值:11)

运行状态	加速	减速	保持	保持
Up指令	ON	OFF	ON	OFF
DOWN指令	OFF	ON	ON	OFF

- 是用控制端子的ON/OFF来控制变频器输出频率的功能。
- 使用这个功能,请务必设定UP指令/DOWN指令双方的2个多功能输入,只单方设定场合,将出现设定出错OPE03。另外同时被设定了"加减速停止(设定值:A)"场合,也会出现设定出错OPE03。
- B1-02(运行方法的选择),请设定为"1"(外部端子)。"1"以外,不动作。
- 频率的UP/DOWN,按照通常时加减时间(C1-01~08)。
- UP/DOWN时,输出频率的上限值和下限值按如下被设定。
- 上限值:最高输出频率(E1-04)×输出频率上限(d2-01)/100
- 下限值:最高输出频率(E1-04)×输出频率下限(d2-02)/100
- 频率指令(电压)端子13,频率指令(电流)端子14作为频率指令输入使用时,频率值的最大值作为下限值。(UP,DOWN共为OFF状态,运行指令为ON时除外)。
- 使用UP/DOWN功能时,一旦输入运行指令则输出频率补加速到下限值为止。
- UP/DOWN功能与点动频率选择在多功能输入被同时设定的场合,则点动频率ON为最优先被选择。
- 设定了UP/DOWN功能场合,多段速指令1~8将全部成为无效。
- UP/DOWN功能下被保持的输出频率,由d4-01(频率指令的保持功能选择)的设定值被记忆(设定值:1)。这个值在电源切断后也被记忆力,运行指令再次输入时,便从这个频率开始运行。这个已记忆的输出频率,在运行指令为OFF状态下,一旦UP指令或DOWN指令(下图的指令频率复位)为ON时,则被清除。

★ =出厂设定值



频率一致信号在运行指令为ON且未进行加减时为ON。
UP指令/DOWN指令的时序图

故障复位(设定值:14)

OFF	正常运转
ON	在ON的上升沿故障复位(没有发生故障场合,则正常的运行)。

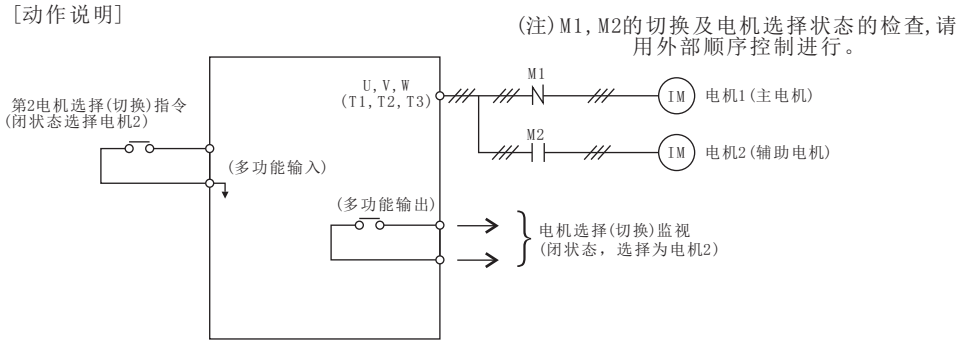
- 是从外部对发生了的故障进行复位的功能。
- 故障发生后,请确认故障内容,实施了对策后再起动变频器。不实施对策维持原样,重复进行故障复位,变频器将会受损坏。
- 故障发生了,将运行指令OFF,故障复位由ON再OFF,运行指令再ON。则 到运行状态,运行指令在ON场合,不能故障复位。
- 没有发生故障状态场合,这个信号ON/OFF一下,也不影响运行

电机切换指令(第2电机选择)(设定值:16)

- 闭:按第2电机的参数运行。

[动作说明]

(注)M1,M2的切换及电机选择状态的检查,请用外部顺序控制进行。



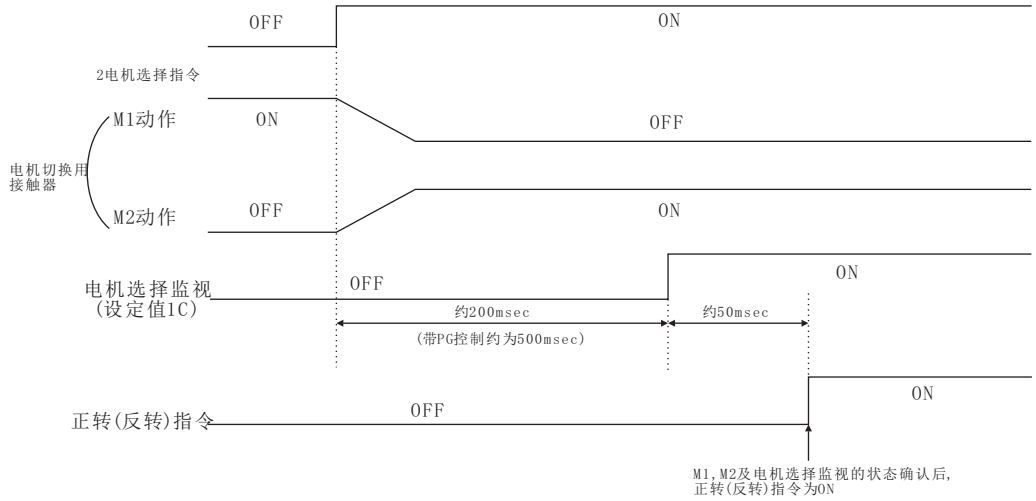
- 在参数H1-01~06(多功能输入)的其中任意一个设定为16(2电机选择指令),则在停止中通过输入信号开闭动作,可以切换变频器内记忆的控制方式,V/f特性,电机参数。
- 在参数H2-01~03(多功能输出)的其中任意一个设定为1C(电机选择监视),则在多功能输出端子可以监视现在的电机选择状态。

★=出厂设定值

• 请设定环境设定内的参数的存取级别A1-01为3(基础设定)或4(高级设定)
• 根据2电机选择(切换)指令,如下参数也随之被替换。

2电机选择指令	开(电机1)	闭(电机2)
控制方式(注)	A1-02(控制方式选择) (环境设定内的参数)	E3-01(电机2控制方式)
V/f特性	E1-04~13(V/f特性)	E4-01~07(电机2V/f特性)
电机参数	E2-01~09(电机参数)	E5-01~06(电机2参数)
电机选择监视	开	闭

(注 A1-02≠E3-01)时,随着电机切换按表的参数被初始化。
• 电机1　电机2切换运行场合的时序图如下所示。



电机1→　电机2切换运行场合的时序图

取消PID控制(设定值:19)

OFF	PID控制有效
ON	PID控制无效(通常的变频器控制)

• 是从外部可以切换PID控制和通常的变频器控制的功能。在通常的变频器控制(开环控制)状态准备运行及进行JOG运行,切换到条件已具备了的反馈闭环控制(PID控制)的场合及反馈值异常时,切换到开环控制场合等可以使用。

参数写入许可(设定值:1B)

OFF	除频率监视外参数不可写入
ON	在环境设定方式可以写入被指定的参数。

• 操作器上的参数写入禁止/许可,也可以从外部进行操作。在参数写入许可为OFF的状态只可以变更在驱动方式下频率监视的频率。

+速度指令(设定值:1C)/-速度指令(设定值:1D)

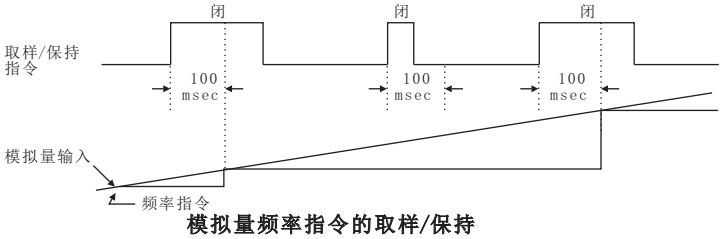
输出频率	指令频率+d4-02	指令频率-d4-02	指令频率	指令频率
+速度指令	ON	OFF	ON	OFF
-速度指令	OFF	ON	ON	OFF

• +速度指令,是在模拟量频率指令上加算一定的频率作为输出频率。
• -速度指令,是在模拟量频率指令上减算一定的频率作为输出频率。
• 这个功能只有从模拟端输入在频率指令场合有效,而且必须被同时设定,否则将会出现设定出错OPE03,两个信号都为ON时,不能进行加算/减算,-速度指令为ON,并减算的结果低于零时,则输出频率为零。

★ =出厂设定值

模拟量频率指令的取样/保持(设定值:1E)

• ″ 闭″状态100msec后,模拟量输入值将作为频率指令。



模拟量频率指令的取样/保持

- 模拟量频率指令的取样/保持,只有对端子13,14,16,或从A1-14U,A1-14B来的模拟量输入有效。
- 当加减速停止(0A),UP/DOWN指令(10,11),+速度/-速度指令(1C,1D)模拟量频率指令的取样/保持(1E),同时设定了2个以上时,便出现设定出错(OPE03)

外部故障(设定值:20~2F)

- 外围设备故障及发生异常时,变频器被停止运行,向外部输出报警的功能设定。
- 作为外部故障的输入条件,可以选择输入时的变频器动作。以下是3个项目的设定组合,请写入适当的设定值(20~2F)
- 输入级别:a接点/b接点
- 检出方法:正常检出/运行中检出
- 动作选择:减速停止/自由滑行停止/非常停止/运行继续

外部故障设定值

设定值	输入级别		检出方法		动作选择			
	a接点	b接点	正常时检出	运行中检出	减速停止(异常)	自由滑行停止(异常)	非常停止(异常)	运转继续(警告)
20	○		○		○			
21		○	○		○			
22	○			○	○			
23		○		○	○			
24	○		○			○		
25		○	○			○		
26	○			○		○		
27		○		○		○		
28	○		○				○	
29		○	○				○	
2A	○			○			○	
2B		○		○			○	
2C	○		○					○
2D		○	○					○
2E	○			○				○
2F		○		○				○

- 输入级别,请设定信号的ON/OFF的哪一个作为异常检出。
  (a接点:ON为外部异常,b接点:OFF为外部异常)
- 检出方法,请设定常时/运行中的哪一个状态进行异常检出。
- 常时检出:变频器,接通电源期间检出。
- 运行中检出:仅在变频器运行中检出。

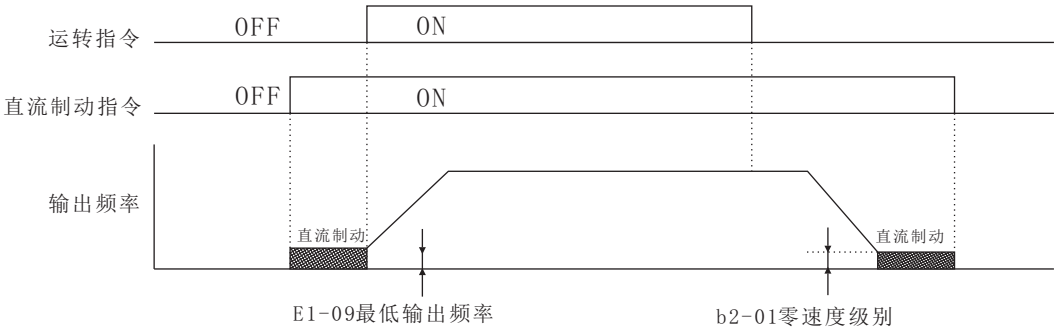
★ =出厂设定值

• 动作选择是设定故障检出后的处理方法。
• 减速停止:输出异常,并按选定的减速时间停止。
• 自由滑行停止:输出异常,变频器切断输出。
• 非常停止:输出异常,按参数C1-09(非常停止减速时间)减速停止
• 继续运行:向外部输出报警,并继续运行
• 向外部输出报警时,请在多功能输出H2-01,-02,-03的其中任意一个设定为"10"报警。
• 2个以上的多功能输入,不能设定同一的外部异常功能。
• 设定外部故障,与其他参数不同,是阶层结构。

直流制动指令（设定值：60）

OFF	通常的动作
ON	变频器停止时进行直流制动(带PG矢量控制时初始励磁)

• 变频器停止时,防止由惯性或外力使电机旋转时使用。
• 变频器停止时,直流制动指令ON时,进行直流制动动作。
• 运行指令或点动指令(点动频率选择,FJOG, RJOG)被输入时,直流制动便被解除,开始运行。



直流制动指令的时序图

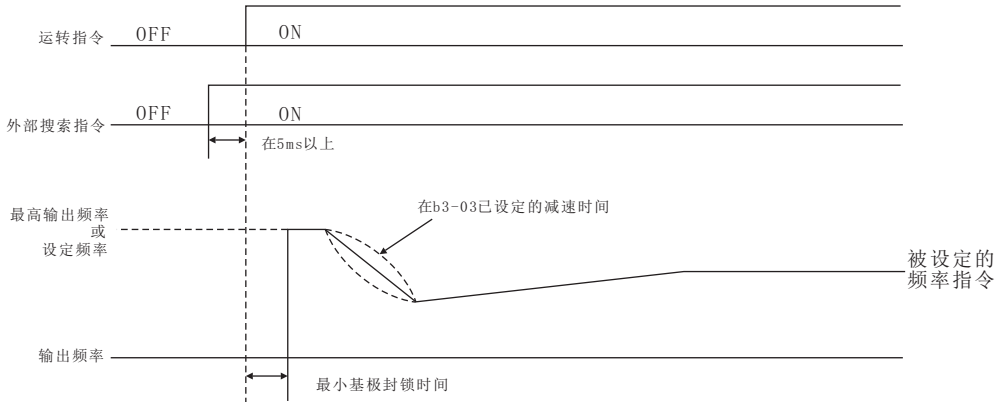
最高输出频率/外部搜索指令1（设定值：61）

OFF	通常的动作
ON	从最高输出频率开始速度搜索

设定频率/外部搜索指令2（设定值：62）

OFF	通常的动作
ON	从设定频率（被输入搜索指令时的指令频率）开始速度搜索

• 外部搜索指令,只能设定2种类的其中一个.
• 商用电源与变频器切换运行场合等,自由滑行中的电机再起动时,使用速度搜索功能可使电机不发生抖动.
• 外部搜索指令为ON后,输入了运行指令,经过最小基极封锁时间(L2-03)后,开始速度搜索.



外部搜索指令的时序图

★ =出厂设定值

5.6.2 多功能输出:H2

H2-01 端子9/10功能选择 X (Terminal 9 Sel)	
取值	
0~37	★ 0]
功能	
多功能接点输出:端子9-10功能选择(接点)	
选择说明	
参考以下说明	

H2-02 端子25功能选择 X (Terminal25 Sel)	
取值	
0~37	★ 1]
功能	
多功能输出1:端子25功能选择(开路集电极)	
选择说明	
参考以下说明	

H2-03 端子26功能选择 X (Terminal 26 Sel)	
取值	
0~37	★ 2]
功能	
多功能输出2:端子26功能选择(开路集电极)	
选择说明	
参考以下说明	

■ 多功能输出的设定:H2

多功能输出功能一览表

设定值	功能	控制方式			
		无PG V/f	有PG V/f	无PG 矢量	有PG 矢量
0	运行中(ON:运行指令ON或电压输出时)	○	○	○	○
1	零速	○	○	○	○
2	频率(速度)一致1(使用幅(L4-02))	○	○	○	○
3	任意频率(速度)一致1(ON:输出频率=±L4-01,使用幅L4-02且速度一致中)	○	○	○	○
4	频率(FOUT)检出1>(ON+L4-01≥输出频率≥-L4-01,使用幅L4-02)	○	○	○	○
5	频率(FOUT)检出2< (ON:输出频率≥+L4-01或输出频率≤-L4-01,检出幅L4-02)	○	○	○	○
6	变频器运行准备结束了(READY)　准备完了:初始处理后,无异常状态)	○	○	○	○
7	主回路低电压(UV)检出中	○	○	○	○
8	基极封锁中(ON:基极封锁中)	○	○	○	○
9	频率指令选择状态(ON:操作器)	○	○	○	○
A	运行指令选择状态(ON:操作器)	○	○	○	○
B	过力矩检出1NO(A接点:ON过力矩检出)	○	○	○	○
C	频率指令丧失中(L4-05频率指令丧失时的运行选择为"1"时有效)	○	○	○	○
D	制动电阻不良(ON:电阻过热或制动晶体管故障)	○	○	○	○
E	故障(ON:除CPF00.CPF01外的故障发生)	○	○	○	○
F	未使用(请勿设定)	—	—	—	—
10	轻故障(ON警告显示时)	○	○	○	○
11	故障复位中	○	○	○	○
12	计时功能输出	○	○	○	○
13	频率(速度)一致2(检出幅L4-04)	○	○	○	○
14	任意频率(速度)一致2(ON:输出频率=L4-03检出幅L4-04)	○	○	○	○
15	频率(FOUT)检测3>(ON:输出频率≤-L4-03,检出幅L4-04)	○	○	○	○
16	频率(FOUT)检测4<(ON:输出频率≥-L4-03,检出幅L4-04)	○	○	○	○
17	过力矩检出1NC(B接点:OFF过力矩检出)	○	○	○	○
18	过力矩检出2NO(A接点:ON过力矩检出)	○	○	○	○
19	过力矩检出2NC(B接点:OFF过力矩检出)	○	○	○	○
1A	反转中(ON:反转中)	○	○	○	○
1B	基级封锁中2(OFF:基极封锁中)	○	○	○	○
1C	电机选择(电机切换中)	○	○	○	○
1D	再生动作中(ON:再生动作中)	X	X	X	○
1E	故障复位再试中(ON:故障复位再试中)	○	○	○	○
1F	电机过载OL1预报警(ON:检测级别90%以上)	○	○	○	○
20	变频器过热OH预报警ON(温度在L8-02以上)	○	○	○	○
30	力矩限值(电流限制)中(ON:力矩极限中)	X	X	○	○
31	速度极限中(ON:速度极限中)	X	X	X	○
33	零伺服完成(ON:零伺服完成)	X	X	X	○
37	运转中2:(ON:频率输出时OFF:基极封锁,直流制动,初始励磁,运行停止)	○	○	○	○

★ =出厂设定值

设定参数

参数NO.	名称	运行中的改变	设定范围	单位	出厂时设定	存取级别			
						无PG V/f	有PG V/f	无PG 矢量	有PG 矢量
H2-01	多功能接点输出端子9-10功能选择	X	0~37	—	0	B	B	B	B
H2-02	多功能输出1:端子25功能选择	X	0~37	—	1	B	B	B	B
H2-03	多功能输出2:端子26功能选择	X	0~37	—	2	B	B	B	B

• 关于以下功能,请参照相关章节

功能	设定值	项目
频率(速度)一致1	2	7.5.6的[频率检出功能的设定:L4-01~ L4-05]
任意频率(速度)一致1	3	
频率(FOUT)检出1>	4	
频率(FOUT)检出2<	5	
过力矩检出NO	B	7.5.6的[过力矩检出功能的设定:L6-01~L6-06]
频率指令丧失中	C	7.5.6的[计时功能的设定:b4-01,b4-02]
计时功能输出	12	
频率(速度)一致2	13	7.5.6的[频率检出功能的设定:L4-01~L4-05]
任意频率(速度)一致2	14	
频率(FOUT)检出3>	15	
频率(FOUT)检出4<	16	
过力矩检出1NC	17	7.5.6的[过力矩检出功能的设定:L6-01~L6-06]
过力矩检出2NO	18	
过力矩检出2NC	19	

• 关于以下的功能,请参照多功能输出功能一览表

功能	设定值
变频器准备结束(READY)	6
主　路低电压(UV)检出中	7
基极封锁中	8
频率指令选择状态	9
运行指令选择状态	A
制动电阻不良	D
故障	E
轻故障	10
异常复位中	11
反转中	1A
基极封锁2	1B
再生动作中	1D
异常复位再试中	1E
力矩极限(电流限制)中	30
速度极限中	31

★ =出厂设定值

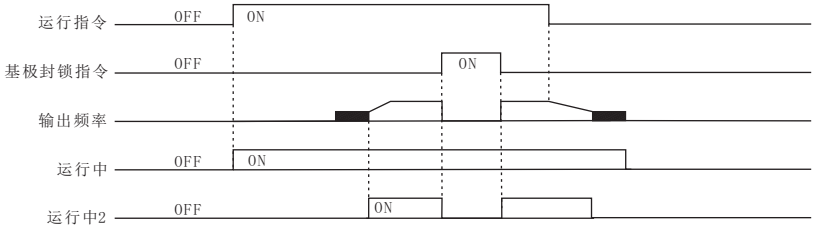
运行中(设定值:0)

OFF	运行指令OFF状态且没有输出电压
ON	运行指令ON,或运行指令为OFF,也有电压输出

运行中2(设定值:37)

OFF	变频器没有输出频率(基极封锁,直流制动,初始励磁,运行停止)
ON	变频器有频率输出

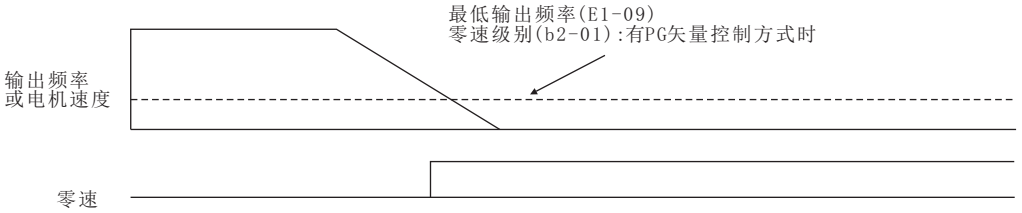
• 变频器的输出运行状态



运行中的时序图

零速(设定值:1)

OFF	输出频率大于最低输出频率(E1-09)[有PG矢量控制,电机速度大于零速级别(b2-01)]
ON	输出频率低于最低输出频率(E1-09)[有PG矢量控制,电机速度低于零速级别(b2-01)]



零速的时序图

电机过载OL1预报警(设定值:1F)

OFF	电机保护功能的电子热保护值未达到检出级别的90%
ON	电机保护功能的电子热保护值超过检出级别的90%

• 利用电子热敏器件,当设定电机过载保护功能有效(L1-01=1)场合,该输出功能有效。
• 可作为保护功能动作前的过热预告。

变频器过热OH预报警(设定值=20)

OFF	散热风扇的温度未达到L8-02的设定值
ON	散热风扇的温度已超过L8-02的设定值

零伺服完成(设定值:33)

OFF	零伺服指令未输入,或零伺服控制位置还未完成
ON	零伺服指令输入后,在位置达到零伺服完成幅度(b9-02)的范围内

• 输出零伺服位置控制是否完成的信号.
• 已输入零伺服指令,且零伺服动作已开始的位置与现在位置的差(位置偏差)达到零伺服完成幅度(b9-02)范围内时ON.

5.6.3 模拟量输入:H3

H3-01 端子13输入信号 X
(Term 13 Segnal)

取值

0~+10V ★ [0]
-10~+10V [1]

功能

频率指令(电压)(端子13)的信号级别设定

选择说明

频率指令(电压),当b1-01(频率指令的选择)设定为"1"时成为有效。

H3-02 端子13输入增益 0
(Term 13 Gain)

取值

0.0~1000.0 ★[100 0]

功能

以输入为10V时的频率,以最高输出频率表示为100%,以%单位设定。

选择说明

参考下面模拟量输入的调整

H3-03 端子13输入偏置 0
(Term 13 Biss)

取值

-100.00~+100.0 ★ [0.0]

功能

设定输入为0V时的频率,以最高输出频率表示为100%,以%单位设定。

选择说明

参考下面模拟量输入的调整

H3-04 端子16输入信号 X
(Term 16 Sel Segnal)

取值

0~+10V ★ [0]
-10~+10V [1]

功能

请设定多功能模拟量输入的信号电平。

选择说明

设定值的说明

设定值	内容
0	0~10V输入[11bit+极性(正/负)输入]
1	0~±10V输入(负电压时,成为与为与已给指令的运行方向相反的运行指令)

H3-05 端子16功能选择 X
(Term 16 Sel)

取值

0~1F ★ [0]

功能

多功能模拟量输入端子16的功能选择

选择说明

模拟量输入的信号级别,增益、偏置,请设定在如右图各参数里。给频率指令(电流)端子14输入电压时,请一定要切断控制基板上的跨线J1。不切断跨线,输入电压的话,输入电阻将被烧坏。在模拟量输入插入一次延迟滤波。

器时,请在H3-12设定时间参数,这个滤波时间参数适用于所有三个模拟量输入器。设定值2和D不能同时设定,会在OPE07被检出

多功能模拟量输入端子16信号级别选择	H3-04(0~+10V或0~±10V)
多功能模拟量输入端子16输入增益	H3-06
多功能模拟量输入端子16输入偏置	H3-07
频率指令(电流)端子14信号级别选择	H3-04(0~+10V或0~±10V或4-20mA)
频率指令(电流)端子14输入增益	H3-10
频率指令(电流)端子14输入偏置	H3-11

★=出厂设定值

多功能模拟量输入/频率指令(电流)的功能一览表

设定值	功能	10V(20mA)输入的时的100%内容	控制方式			
			无PG V/f	有PG V/f	无PG 矢量	有PG 矢量
0	辅助频率指令(仅03-05)	最高输出	○	○	○	○
1	频率增益	频率指令(电压)端子的频率指令值	○	○	○	○
2	频率偏置(旋转方向变化时零极限)	最高输出频率(与H3-03设定值加算)	○	○	○	○
4	输出电压偏置	电机额定电压(E1-05)	○	○	X	X
5	加减速时间增益(短缩系数)	已设定加减速时间(C1-01~08)	○	○	○	○
6	直流制动(DB)电流	变频器额定输出电流	○	○	○	X
7	过力矩检出级别	V/f控制:电机额定电流,矢量控制:电机额定力矩	○	○	○	○
8	运行中失速防止级别	变频器额定电流	○	○	X	X
9	输出频率下限级别	最高输出频率	○	○	○	○
A	设定禁止频率	最高输出频率	○	○	○	○
B	PID反馈	最高输出频率	○	○	○	○
C	PID目标值	最高输出频率				
D	频率偏置	最高输出频率(与H3-03的设定值加算)				
10	正转侧力矩限值	电机额定力矩	X	X	○	○
11	反转侧力矩限值	电机额定力矩	X	X	○	○
12	再生状态力矩限值	电机额定力矩	X	X	○	○
13	力矩指令/速度控制时力矩极限	电机额定力矩	X	X	X	○
14	力矩补偿	电机额定力矩	X	X	X	○
15	正转/反转两侧力矩极限	电机额定力矩	X	X	○	○
	不使用模拟量输入(H3-05)	——	○	○	○	○
1F	频率指令(H3-09详细请参照功能方框图)	最高输出频率	○	○	○	○

★=出厂设定值

H3-06 端子16输入增益 O
(Term 16 Gain)

取值

0.0~1000.0 ★[100 0]

功能

用10V输入时的各功能的指令量,以%为单位设定

选择说明

参考下面模拟量输入的调整

H3-07 端子16输入偏置 O
(Term 16 Blas)

取值

-100.0~+100.0 ★[0.0]

功能

0V输入时的各功能的指令量,以%为单位设定

选择说明

参考下面模拟量输入的调整

H3-08 端子14输入信号 X
(Term 14 Sel)

取值

0~+10V [0]
0~±10V [1]
4~+20mA ★[2]

功能

多功能模拟量端子14信号级别选择

选择说明

频率指令(电流),当b1-01(频率指令的选择)设定为"1"时为有效。
设定频率指令(电流)信号的信号级别。

设定值的说明

设定值	内容
0	0~10V输入[10bit输入]
1	0~±10V输入(负电压时,成为与已给指令的运行方向相反的运行指令)
2	4~20mA输入

作为使用电压输入端子的场合(设定值0或1),请切断控制基板上的跨线J1。不切断跨线而输入电压,会烧坏输入电阻。电压输入端子和电流输入端子同时输入频率指令,则两者相加作为最终的指令值。
频率指令的电压端子和电流端子切换使用场合,请在多功能输入(H1-01~H1-06)的其中任意一个设定为"1F"。这个多功能输入为OFF场合,只要从电压端子(端子13)来的指令为ON,则从电流端子(端子14)来的指令成为有效。设定值为"1"(0~±10V输入)场合,H3-01也为"1"(0~±10V输入)是必要条件。

H3-09 端子14功能选择 X
(Term 14 Sel)

取值

0~1F ★[1F]

功能

频率指令(电流)端子14功能选择

选择说明

参考H3-05的选择说明

H3-10 端子14输入偏置 O A
(terminall4 Gain)

取值

0.0~1000.0 ★[100]

功能

10V(20mA)输入时的各功能的指令量,以%为单位设定

选择说明

参考下面模拟量输入的调整

H3-11 端子14输入偏置 O A
(Terminall 4 Blas)

取值

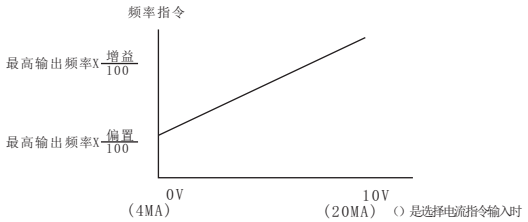
-100.0~+100.0 ★[0.0]

功能

0V(4mA)输入时的各功能的指令量,以%单位设定

选择说明

模拟量输入的调整说明。作为模拟量输入的调整用参数,有增益和偏置(对各个输入个别设定)及延迟时间参数(全部模拟量输入共通)3种类。
各模拟量输入(端子13,14,16),可一个个调整增益及偏置的设定。
增益 请设定10V(20mA)输入时为频率的多少%(以最高输出频率E1-04 为100%) 偏置请设定0V(4mA)输入时为频率的多少%(以最高输出频率E1-04为100%)对频率指令(电压)端子13,14,16的增益和偏置的设定仅在选择了多功能模拟量输入时有效,选择了频率指令场合,这个增益、偏置被视为无效,按照端子13已设定的增益、偏置。



增益与偏置

H3-12 滤波常数 X
(Filter Avg Time)

取值

0.00~2.00 ★[0.00]

功能

3个模拟量输出(端子13,14,16)的一次延迟时间参数以秒为单位设定

选择说明

在3个模拟量输入[频率指令(电压)/频率指令(电流)/多功能模拟量输入]可设定一次延迟时间参数。模拟量输入信号的剧烈变化场合及噪声叠加在信号上时,设定有效。设定值太大时,应答性将降低。

5.6.4 多功能模拟量输出:H4

H4-01 端子21监视选择 X
(Terminal 21 Sel)

取值

1~38 ★[2]

功能

请设定要想在多功能模拟量输出1(端子:21)输出的监视项目的编号("U1-□□"的一□□部分的数值。

选择说明

★=出厂设定值

在多功能模拟量输出,可输出变频器状态监视项目U1，在监视参数一监视（表4.3）中的"U1-"的一部分,请设定数值。设定范围虽然从"1~38",但不能设定"4,10,11,12,13,14,25,28,34,35"。"29~31"未使用。

H4-02 端子21输出增益 0
(Terminal 21 Gain)

取值

0.00~2.50 ★[1.00]

功能

设定多功能模拟量输出1的电压级别增益，设定监视项目的100%输出为10V的多少倍

H4-03 端子21输出偏置 0
(Terminal 21 Bias)

取值

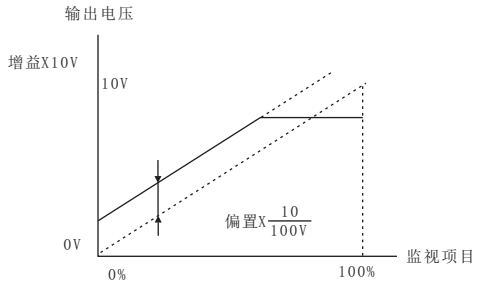
1 0.0~+10.0 ★[0.0]

功能

设定多功能模拟量输出1的电压级别偏置,使输出特性上下平移动量,以10V为100%,以%为单位设定。

选择说明

在多功能模拟量输出增益,请设定项目的100%输出是10V的多少倍。多功能模拟量输出偏置， 是设定输出特性上下平移动量,以10V为100%请 以%单位设定。



监视输出的调整

H4-04 端子23监视选择 X
(Terminal 23 Sel)

取值

1~38 ★ 3]

功能

请设定要想在多功能模拟量输出2(端子：23)输出的监视项目的编号("U1-□□"的一□□部分的数值。)

选择说明

参考H4-01说明

H4-05 端子23输出增益 0
(Terminal 23 Gain)

取值

0.00~2.50 ★[0.05]

功能

设定多功能模拟量输出2的电压级别增益，设定监视项目的100%输出为10V的多少倍。

选择说明

参考H4-02说明

H4-06 端子23输出偏置 0
(Terminal 23 Bias)

取值

-10.0~+10.0 ★[0.0]

功能

设定多功能模拟量输出2的电压级别偏置,使输出特性上下移量,以10V为100%,以%为单位设定。

选择说明

参考H4-03说明

H4-07 输出信号形式 X
(Ao Level Select)

取值

0~+10v输出 ★[0]
-10~+10V输出 [1]

功能

设定多功能模拟量输出1,2(端子:21,23)信号输出级别。

选择说明

此信号级别设定适用于多功能模拟量输出1,2(端子21,23)。速度(频率指令,输出频率,电机速度)在0±10V范围输出场合变频器输出为正转方向时+电压。变频器输出为输出一电压反转。(偏置设定值为:0.0%时)。当设定在0~±10V范围时,有些监视项目只能输出0~+10V。请参照监视一览表。

设定值	内容
0	0~+10V（绝对值输出）
1	0~±10V

5.6.5 数据总线通信:H5

H5-01 变频器站地址 X
(Serial Comm Adr)

取值

0~20 ★[1F]

功能

设定变频器的位置地址

H5-02 传送速率选择 X
(Serial Com Sel)

取值

1200Baud [0]
2400Baud [1]
4800Baud [2]
9600Baud ★[3]
19200Baud [4]

功能

选择6CN的MEMOBUS传送的传送速度

H5-03 传送校验 X
(Serial Com Sel)

取值

奇偶无校 ★[0]
偶数校验 [1]
奇数校验 [2]

功能

选择6CN的MEMOBUS传送奇偶校验

H5-04 传送出错检出 X
(Serial Fault Sel)

取值

减速停止 ★[0]
自由停车 [1]
非常停止 [2]
继续运行 [3]

★=出厂设定值

功能

传送出错检出时的停止方法选择

H5-05 传送超时检出 X

无效	[0]
有效	★[1]

功能

选择传送超时是否作为传送出错检出

5.7: 保护功能（L）参数

5.7.1 电机保护功能:L1

L1-01 X
(Mol Fault Select)

取值

无效	[0]
自由停车	★[1]

功能

设定电子热保护对电机过负载保护功能的有效/无效。

选择说明

以电机额定电流(E2-01)的设定值作为基准检出。1台变频器与2台以上电机连接场合请设定为"0"无效,但为了保护电机,请在与各电 机的连接上接热继电器等,对各个电机分别进行过载保护。应用在电源频繁地ON/OFF场 合,由于电源OFF时电子热保护的演算值被复位。因此即使设定为"1"(有效),也不能保护。电机过载保护功能有效时,且在多功能输出(H2-01~H2-03)已设定电机过载OL1预报警(设定值:1F)场合,当电子热保护值达到过载检出级别的90%以上时,该多功能输出为ON。

L1-02 保护检出时间 X
(Mol Time Const)

取值

0.1~5.0	★[1.0]

功能

电子热保护的检出时间,以分钟为单位设定。

选择说明

通常没有必要改变设定。出厂设定为150%过载1分钟能力。电机在额定电流连续运行后,要设定150%过载(热起动)的电子热保护动作时间。已明确电机过载值场合,请设定与电机热保护启动相适合的过载值,但是要略有余量。需要尽早检出过负载场合,请减小设定值。

5.8.2 瞬间停电处理:L2

L2-01 瞬停动作选择 X
(Pwrl Selection)

取值

无效	★[0]
有效	[1]
CPU动作中有效	[2]

功能

瞬时停电时的处理设定

选择说明

请选择瞬时停电已发生场合的处理方法。选择瞬时停电动作有效(设定值:1或2)的场合,在允许时间内电源复位的话,则开始速度搜索后,再起动。选择瞬时停电动作无效(设定值:0)时,只要发生15ms以上的瞬时停电,则UV异常检出。

L2-02 瞬停补偿时间 X
(Pwrl Ridethru t)

取值

0.0~2.0	★[2.0]

功能

瞬时停电动作选择(L2-01)设定了"1"时的补偿时间,以秒为单位设定。

选择说明

根据变频器容量,出厂值有所不同。瞬时停电动作选择(L2-01)为"1"有效时,瞬时停电补偿时间,以秒为单位设定。

L2-03 基极BB时间 X
(Pwrl Basebolck t)

取值

0.1~5.0	★[0.5]

功能

瞬时停电恢复后再起动,变频器的最小基极锁定时间,以秒为单位设定。

选择说明

根据变频器容量,出厂值有所不同。是速度搜索及直流制动时使用的参数。设定电机的残留消失时间,在速度搜索或直流制动开始时发生OC(过电流)场合请增大设定值。

瞬时停电后的速度搜索与通常的速度搜索都有效。

L2-04 电压复归时间 X
(Pwrl V/F Ramp T)

取值

0.0~5.0	★[0.3]

功能

速度搜索完后,恢复到通常电压的时间,以秒 为单位设定。

选择说明

设定速度搜索成功后,通常是电压复位时间。400V级指从0V开始恢复到400V的时间。 电压复归时间在瞬时停电后的速度搜索,通常的速度搜索,节能控制时的电压变化,基级锁定解除时的电压变化时可使用。

L2-05 低电压检出值 X
(PUV Det Level)

取值

130~420	★[380]

功能

主 路低电压(UV)的检出级别(主 路直流电压),用V为单位设定。

选择说明

设定范围及出厂设定的数值为400V级。通常,没有变更设定值的必要。当要接入AC电抗器,并要降低主 路低电压的检出电平设定值时,请设定检出主 路低电压的主 路直流电压值(V)。

L2-06 KEB减速频率 X
(KEB Frequency)

取值

0.0~100.0	★[0.0]

功能

由于在瞬时停电的同时进行频率控制,使发生惯性能量,由于这个能量 避了停电,因此是使复位到停电前的运行状态的功能。

★=出厂设定值

选择说明

瞬时停电和频率减速同时进行时,便发生了惯性能量。由这个能量 避了停电现象,是复归停电前的运行状态的功能。本功能主要适用于使用直流的母线排电源多个变频器并用场合,瞬时停电同时进行减速,防止速度变动引起的使动线停止.

KEB 动作通过多功能输入端KEB指令(设定值:65或66)来实行。适用功率范围400V级0.4~18.5KW

5.7.3 失速防止功能:L3

L3-01 加速防止选择 X X (Staiip Accel Sel)	
取值	
无效	★[0]
有效	[1]
最适调整	[2]

功能

防止失速功能的设定

选择说明

所谓失速状态,就是电机上加了大负载时或进行急速加减速时,出现的[电机失速了] [电机失速跳脱]状态。

变频器的失速防止功能可在加速中/运行中/减速中分别设定,根据控制方式,也会有不能使用的功能。设定值的说明有效(设定值:1)的场合,电机电流超过加速中失速防止值便停止加速,降到这个值以下再加速。根据负载情况,加速时间会长于设定值。最适加速(设定值:2)的场合电机电流以加速防止值为基准加速。

这时,加速时间的设定将被视作无效。

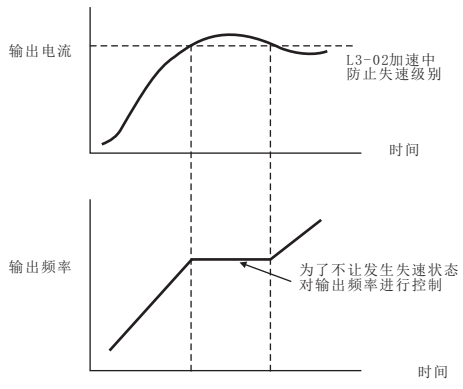
L3-02 加速防止电平 X X (Staiip Accel Lv1)	
取值	
0~200	★[150]

功能

L3-01选择"0""1"时有效,以变频器额定电流为100%,以%单位设定。

选择说明

此设定在加速中防止失速功能选择(L3-01)为1,2时有效。通常没有变更设定值的必要。相对变频器功率,电机功率较小场合,按出厂设定不变,运行有发生失速时,请减小设定值,以变频器的额定电流为100%,以%为单位设定。



加速中失速防止功能 (L3-01=1的场合)

★=出厂设定值

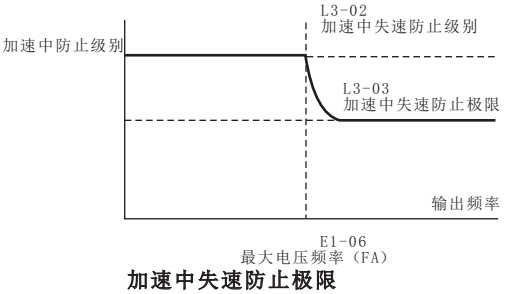
L3-03 加速防止极限 X A (Staiip Chp Lv1)	
取值	
0~100	★[50]

功能

使用在最大电压频率(E1-06)以上的频率范围时,加速中失速止级别的极限以变频器额定电流作为100%,以%单位设定。

选择说明

通常没有变更设定值的必要。使用在恒功率输出(高于最大电压频率领域)的高速电机场合时,请设定。设定的标准是电机的额定电流,这个电流值,以变频器的额定输出电流为100%,以%单位设定。



加速中失速防止极限

(注)电机使用在恒功率输出场合为了平滑地加速,加速中失速防止级别自动降低。加速中失速防止极限(L3-03)是在恒功率输出范围,为了不让失速防止级别降低在必要值以下的极限值。

L3-04 减速防止选择 X (Staiip Dccel Sel)	
取值	
无效	[0]
有效	★[1]
最适调整	[2]
有效(有制动电阻)	[3]

功能

减速中防止失速功能选择

选择说明

有效(设定值:"1")的场合,为了不发生 路过电压(OV),自动延长减速时间。使用制动选择(制动电阻,制动电阻单元,制动单元)。请务必设定"0"或"3",除此以外的设定、制动选择将不能有效使用,减速时间不能缩短。设定值为"0"的场合减速中失速防止处理为无效。设定值为"3"的场合,主 路过电压(OV)容易发生时,自动地延长减速时间, 较难发生时, 按减速时间设定值减速。虽然实际的减速时间比设定值要长,但为了能

减速中防止失速功能选择:L3-04

参数No.	名称	运行中的改变	设定范围	单位	出厂时设定	存取级别 无PG V/F	存取级别 无PG 矢量
L3-04	减速中防止失速功能选择	X	0~3	—	1	B	B

设定值的说明

设定值	内容
0	无效按设定减速,减速时间过短,会发生主 路过电压(OV)
2	有效(主因路电压接近过电压级别时停止减速,电压恢复后,再减速)
3	最适减速(从主 路电压来判断最短减速时间,设定的减速时间被视为无效)
4	有效(有制动电阻)

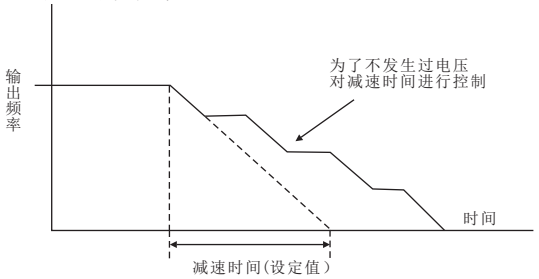
设定较短的减速时间相比设定值″0″显然是可实现最短时间减速。减速中失速防止功能设定为″3″使用时，务必按以下顺序调整。

调整**调整顺序**顺序

1、减速时间,要根据制动能力和机械惯性来设定时间。

2、1的时间不明场合,先将L3－04的设定值为″0″做一下试运行,求得最小减速时间之后,再将L3－04设定为″3″。

3、在不发生主　路过电压(OV)范围,降低减速时间的设定值。



减速中失速防止动作（L3－04＝1的场合）

L3-05　运行防止选择　X　X　X
(Stallp run sel)
取值
无效　★　[0]
有效－DEC1　[1]
有效－DEC2　[2]

功能

运行中失速防止功能选择

选择说明

有效(设定值″1″,″2″)的场合,运行中达到失速防止电流级别连接100ms以上,则开始减速,电流值降到该级别以下后,再加速到指令的频率运行。

L3-06　运行防止电平　X　X　X
(Stallp Run Level)
取值
30～200　★　[60]

功能

L3－05设定为″1″″2″的场合有效以变频器额定电流为100%,以%单位设定。

选择说明

通常,没有变更设定值的必要。当电机容量与变频器容量相比较小时或按出厂值运行电机会发生失速时,应减小该设定值。

5.7.4 频率检出:L4

L4-01　频率检出值　X　B　B
(Spd Agree Level)
取值
0.0～400.0　★[0.0]

功能

在多功能输出,设定了″任意频率(速度)一致1″

选择说明

是在多功能输出,频率一致,任意频率一致,频率检出等信号输出时设定。

L4-02　频率检出幅　X　B　B
(Spd Agree Width)
取值
0.0～20.0　★[2.0]

功能

在多功能输出,设定了″频率(速度)一致″″任意频率(速度)一致1″

L4-03　频率检出值+/－　X　A　A
(Spd Agree Lv1 +-)
取值
－4000.0～＋4000.0　★[0.0]

功能

在多功能输出,设定了″任意频率(速度)一致2″

L4-04　频率检出幅+/－　X　A　A
(Spd agree width +-)
取值
0.0～20.0　★[2.0]

功能

在多功能输出,设定了″频率(速度)一致″″任意频率(速度)一致2″选择说明

参数NO.	名称	运行中的改变	设定范围	单位	出厂时设定	存取级别	
						无PG V/F	无PG矢量
L4-01	频率检出级别	X	0.0~400.0	Hz	0.0	B	B
L4-02	频率检出幅	X	0.0~20.0	Hz	2.0	B	B
L4-03	频率检出级别(+/-)单侧检出	X	-400.0~+400.0	Hz	0.0	A	A
L4-04	频率检出幅(+/-)单侧检出	X	0.0~20.0	Hz	2.0	A	A

L4-05　指令丧失方式　X　A　A
(RefLoss Sel)
取值
停止　★　[0]
80%运行　[1]

功能

频率检出动作

选择说明

所谓频率指令丧失状态是指频率指令电压在400ms时间内降低90%以下。

5.7.5 异常复位再试:L5

L5-01　复位再试次数　X　B　B
(Num Of Restarts)
取值
0～10　★[1.0]

功能

设定异常复位再试的次数,自动异常复位,从运行频率开始实施速度搜索。

选择说明

故障复位再试功能频繁使用,变频器会有损坏的可能。所谓故障复位再试,是变频器在运行中发使用故障复位再试功能的场合,请务必设置断路保护器。用顺序控制设计程序一旦生了内部故障,也能自动再起动的功能。变频器发生故障,周边的机械被停止运行。故障复位再试的对象,　如下所示,除此以外的故障,不能故障复位再试,而是保护动作马上动作。

★=出厂设定值

OC（过电流）、PF(主　路电压故障)、OL1　(电机过载)、GF（接地)、LF（输出缺相)、OL 2(变频器过载)、PUF（保险丝熔断)、RF（制动电阻过热)、OL3（过力矩)、　OV（主　路过电压)、RR(制动晶管故障)、OL4（过力矩)、UV1（主　路低电压)故障复位再试次数的计数器,有如下情况时,被清零。故障复位再试后正常运行持续１０分钟以上时；保护动作作用,故障已确定后输入故障复位时；电源切断后再投入时。输出故障复位再试中信号时,把多功能输出
(H 2— 0 1 ～ 0 3）中的一个设为1E 。

L5-02　再试接点动作　　X　　B　B
(Restart Sel)

取值

不输出	★	[0]
输出		[1]

功能

设定故障复位再试中的故障接点动作选择

5.7.6　过力矩检出:L 6

L6-01　过力矩检出1　　X　　B　B
(Torq Det 1 Sel)

取值

检出无效	★	[0]
一致中,警告		[1]
运行中,警告		[2]
一致中,停车		[3]
运行中,停车		[4]

功能

力矩检出功能的设定

选择说明

[0]:过力矩检出无效
[1]:速度一致中检出/检出后继续运行
[2]:运行中检出/检出后继续运行
[3]:速度一致中检出/检出时切断输出
[4]:运行中检出/检出切断输出
参考以下说明

L6-02　力矩检出值1　　X　　B　B
(Torq Det1 Lv1)

取值

0~300　　★[150]

功能

矢量控制:电机额定力矩作为100%设定V/F控制:变频器额定电流作为100%设定

选择说明

参考以下说明

L6-03　检出时间1　　X　　B　B
(Torq Det 1Time)

取值

0.0~10.0　　★[0.1]

功能

过力矩检出的检出时间,以秒为单位设定

选择说明

参考以下说明

L6-04　过力矩检出2　　X　　A　A
(Torq Det 2 Sel)

取值

0~4　　★ [0]

功能

设定方法与过力矩检出1(L6-01)相同
过力矩检出1在多功能输出"过力矩检出1NO/NC"
过力矩检出2在多功能输出"过力矩检出2NO/NC"

选择说明

参考以下说明

L6-05　力矩检出值2　　X　　A　A
(Torq Det 2 Lv1)

取值

0~300　　★[150]

功能

设定方法与过力矩检出1(L6-02)相同
过力矩检出1在多功能输出"过力矩检出1NO/NC"
过力矩检出2在多功能输出"过力矩检出1NO/NC"

选择说明

参考以下说明

L6-06　检出时间2　　X　　A　A
(Torq Det 2 Time)

取值

0.0~10.0　　★[0.1]

功能

设定方法与过力矩检出1(L6-03)相同过力矩检出1在多功能输出"过力矩检出1NO/NC"过力矩检出2在多功能输出"过力矩检出2NO/NC"

选择说明

过力矩检出说明：所谓过力矩检出功能,是指当机械被加过分大的负载时,输出电流(或输出力矩)的增加被检出的功能。
在过力矩检出动作选择(L6-01,L6-04)请设定过力矩检出的有无及过力矩检出时的处理方法。
进行过力矩检出时,请设定过力矩检出级别(L6-02,-05)和过力矩检出时间(L6-03，-06)。过力矩,当电流超过检出级别并持续检出时间以上时被检出。(或力矩超过检出级别并持续检出时间以上输出后被检出)。
过力矩检出级别的设定,根据控制方式而有不同。无PG矢量,有PG矢量:电机额定力矩为100%设定。无PGV/f,有PGV/f:以变频器额定电流为100%设定。过力矩检出后向外部输出时，请在多功能输出(H2-01~H2-03)设定功能。
过力矩检出1NO:设定值"B"
过力矩检出1NC:设定值"17"
过力矩检出2NO:设定值"18"
过力矩检出2NC:设定值"19"

5.7.7　力矩极限:L7

L7-01　正转力矩极限　　X　X
(Torq Del 1 Sel)

取值

0~300　　★[200]

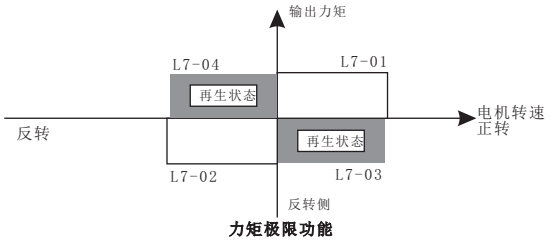
功能

力矩极限值,相比电机额定力矩按%设定,可4个象限个别设定

选择说明

可设定在正转/反转,正转侧再生/反转侧再生的4象限的力矩极限。
各种参数的关系由下一页图所示。

★ =出厂设定值



力矩极限功能

力矩极限功能动作时,由于力矩控制优先,电机的转速控制和补偿都无效,因此,会出现加减速时间增加及转速降低的情况。

L7-02 反转力矩极限 X
(Torq Del 1 Lv1)

取值

0~300 ★[200]

功能

力矩极限值,相比电机额定力矩按%设定,可4个象限个别设定

选择说明

参考L7-01说明

L7-03 正转再生极限 X
(Torq Del 1 Time)

取值

0~300 ★[200]

功能

力矩极限值,相比电机额定力矩按%设定,可4个象限个别设定

选择说明

参考L7-01说明

L7-04 反转再生极限 X
(Torq Del 1 Sell)

取值

0~300 ★[200]

功能

力矩极限值, 相比电机额定力矩按%设定,可4个象限个别设定

选择说明

参考L7-01说明

5.7.8 硬件保护:L8

L8-01 制动电阻保护 X
(DB Resistor Prot)

取值

无效 ★ [0]
有效 [1]

功能

硬件保护功能的设定

选择说明

设定值	内容
0	无效（使用制动电阻器单元形式LKEB时设定）
1	有效（使用安装型制动电阻ERF150WJ的进行过热保护）

L8-02 OH报警温度 X A A
(OH Pre-Alarm Lvl)

取值

50~110 ★ [85]

功能

变频器过热(OH)报警预告功能检出温度用° C单位设定

选择说明

请以° C单位设定变频器过热(OH)预报警的检出温度,散热风扇的温度以作为检出对象,达到设定值时,OH预报警。

L8-03 OH报警动作 X A A
(OH Pre-Alarm lv1)

取值

按C1-02停止 [0]
自由停车 ★[1]
按C1-09停止 [2]
继续运行 [3]

功能

设定变频器过热(OH)警告检出后的动作

选择说明

在L8-03,请设定变频器过热(OH)预报警已检出后的动作。除此之外,作为保护动作的达到105温度° C时OH1(散热片过热)可被检出。

L8-05 输入缺相保护 X A A
(PH Los In Sel)

取值

无效 [0]
有效 ★[1]

功能

输入欠相保护选择

选择说明

检出由电源欠相、电源电压很不平衡及主 路电解电容的劣化而产生主 路直流电压的变动。

L8-07 输出缺相保护 X A A
(PH Los Out Sel)

取值

无效 ★[0]
有效 [1]

功能

输出缺相保护选择

选择说明

变频器检出输出缺相的功能。相对变频器功率,电机功率较小场合,会被误检出输出缺相,这种情况,请设定为"0"(无效)。

L8-10 接地保护 X A A
(Gnd Det Sel)

取值

无效 ★[0]
有效 [1]

L8-17 载波低减选择 X A A
(L-spd IGBT Prtct)

取值

不降载波 ★[0]
降低载波 [1]
工厂专用 [2]
工厂专用 [3]

功能

载波频率低减选择

选择说明

低减(6Hz未满)电机发出金属音(载波音)问题时,请设

★ =出厂设定值

L8-19 低速时的OL2特性 X A A
(OL2 Cbara@L-Spd)

取值

无效	★ [0]
有效	[1]

功能

低速时的OL2特性选择

选择说明

在低减(6Hz未满),虽然负载很轻可是还是出现OL2跳脱场合,请设定L8-17=1(有载波频率低减),L8-19(低速时012特性选择)为"0"(无效)。V/f控制,无PG矢量控制,请勿同时将L8-17,L8-19设定为"0"。

5.8: 操作器(o)的参数

5.8.1 监视选择:o1

o1-01 驱动监视选择 O
(Monitor Select)

取值

4~38	★ [6]

功能

驱动方式时,设定想要表示的监视项目编号设定

选择说明

出厂设定时,在驱动方式下,频率指令,输出频率,输出电流,输出电压可显示出来。在此当中输出电压可以和其他监视项目置换。想要表示输出电压以外的监视项目请设定这个参数的监视项目编号。监视项目的编号,是监视参数一览重新定位"U1-□□"中的□□部分数值。

o1-02 电源投入监视 O
(Power-On Monitor)

取值

频率指令	★ [1]
输出频率	[2]
输出电流	[3]
o1-01设定	[4]

功能

电源输入时,可设定想要表示的监视项目。

选择说明

电源输入时,在数据显示部分显示频率指令(有出厂设定时)电源输入的监视项目可在频率指令,输出频率,输出电流或o1-01设定的项目中选择。
想要显示频率指令以外的监视项目场合,请变更这个参数的设定值。

o1-03 线速度设定 X
(Dispay Scaling)

取值

0.01Hz单位	★ [0]
0.01%单位	[1]

功能

设定频率指令:频率的监视,设定/表示单位。

选择说明

设定值的说明
使用40~3999范围的设定值,可自由地设定表示值,例如可配合机械的动作速度(mm/s单位及m/min单位等)表示,设定。

o1-04 显示单位 X X X
(Display Units)

取值

Hz单位	[0]
R/min单位	★ [1]

功能

设定频率关系的参数的设定单位(E1-04,06,09的设定单位)。

选择说明

可以变更E1-04,E1-06,E1-09的设定单位。除此之外的频率单位不变,01-04是有PG矢量控制方式的专用功能。

o1-05 参数表示方法 X A A
(Address Display)

取值

通常表示(A1-00等)	★ [0]
MEMOBUS(通信的寄存器地址)	[1]

功能

选择操作器的参数NO.表示方法

5.8.2 多功能选择:o2

o2-01 L/R选择键 X
(Local/remote Key)

取值

无效	[0]
有效	★ [1]

功能

设定运行方法选择键(LOCAL/REMOTE键)的功能

选择说明

请设定数字式操作器的LOCAL/REMOTE键,(运行方法选择键)的有效或无效。

o2-02 设定STOP键 X
(Oper Stop Key)

取值

无效	[0]
有效	★ [1]

功能

设定停止键(STOP键)的功能

选择说明

请设定数字式操作器的STOP键(停止键)的有效或无效。

o2-03 用户记忆参数 X
(User Defaults)

取值

记忆保持/未设定	★ [0]
记忆开始	[1]
记忆清除	[2]

功能

使用用户参数初始化时,初始值是记忆/清除

选择说明

是记忆/清除在用户参数里的作为初始化使用的初始值的参数(用户已设定的参数),可以作为用户参数初始值让变频器记忆。设定后,操作器显示 到0。

★=出厂设定值

o2-04 容量设置 X
(Inverler Model#)

取值

0~FF ★ 禁止设定

功能

请勿设定

选择说明

设定范围及出厂设定根据变频器容量而不同,是制造厂管理用参数,请勿变更。

02-05 频率设定方法 X A A
(operator M.o.p)

取值

写入键(WRITE)必要 ★ [0]
写入键(WRITE)不要 [1]

功能

在操作器的频率指令监视状态,变更频率指令的场合,设定写入键必要或不必要。

选择说明

在数字式操作器监视频率指令状态变更频率指令时,请设定READ/WRITE键必要还是不必要。已设定为"1"(READ/WRITE键不必要)场合.在操作数值改变的同时,频率指令值被变更了。

o2-06 键盘断线选择 X A A
(Oper Delection)

取值

继续运行 ★ [0]
停止输出,报警 [1]

功能

设定操作器断线时的动作

o2-07 累计时间初值 X A A
(Elapsed Time Set)

取值

0~65535 ★ [0]

功能

累计工作时间的初始值用小时单位设定

选择说明

在o2-07,请设定累计运行时间的初始值。累计时间从设定值开始累计。

o2-08 累计时间选择 X A A
(Elapsed Time Run)

取值

电源投入时间 ★ [0]
运行时间 [1]

功能

累计运行时间设定

选择说明

在o2-08,请设定累计的时间

★=出厂设定值

第六章　故障查找

6.1 保护.诊断功能

6.1.1 故障检查

当变频器检测出故障时,在数字操作器上显示该故障内容,并使故障接点输出,切断输出电机自由滑行停止。(但是在可选择停止方法的故障时,服从已设定的停止方法)。

- 发生了故障时,查找下表并采取纠正措施。
- 再启动时,请按如下的任意一个方法,进行故障复位。
- 异常复位信号为ON。
  [多功能输入(H1-01～H1-6),请设定为异常复位(设定值:14)]
- 按下数字操作器的复位键。
- 切断主回路电源后再重新合上电源。

故障表示和对策

故障表示	内容	原因	对策
OC Overcurrent	**过电流** 变频器的输出电流超过了过电流检出值。(约额定电流的200%)	• 变频器输出侧发生短路,接地(电机烧毁,绝缘劣化,电缆破损而引起的接触,接地等) • 负载太大,加速时间太短 • 使用了特殊电机或最大适用功率以上的电机 • 变频器输出侧电磁开关	调查原因,实施对策后复位
GF Grornd Favlt	**接地** 变频器输出侧的接地电流超过了变频器额定输出电流的50%	变频器输出侧发生接地短路(电机的烧毁,绝缘劣化,电缆破损而引起的接触接地等)	调查原因,实施对策后复位
PUF DC Bus FuseOpen	**保险丝熔断** 装在主回路的保险丝被熔断了。	由于变频器输出侧的短路,接地造成输出晶体管损坏,确认如下的端子问是否短路,如果是短路,则晶体管已损坏: B1<->U、V、W Θ<->U、V、W	调查原因实施对策后,更换变频器
SC Short Circuit	**负载短路** 变频器的输出或负载已短路	变频器输出侧发生发接地短路(电机的烧毁,绝缘劣化,电缆破损而引起的接触接地等)	调查原因,实施对策后复位
OV Overvoltage	**主回路过电压** 主回路直流电压超过过电压检出值400V级：800V级	减速时间太短，从电机再生的能量太大电源电压太高	延长减速时间或接制动电(制动电　单元) 将电压降到电源规格范围内
UV1 DC Bus Undervolt	**主回路低电压** 主回路直流电压低于低电压检出(L2-05)400V级:约380V级	• 输入电源发生了缺相 • 发生了瞬时停电 • 输入电源的接线端子松动 • 输入电源的电压变动太大	调查原因，实施对策后复位
UV2 CTL PS Undervolt	**控制电源异常** 控制电源电压太低		• 将电源ON/OFF试一下 • 连续发生异常情况时请更换变频器
UV3 MC Answerback	**防止浪涌回路故障** 发生了防止浪涌回路动作不良	—	• 将电源ON/OFF试一下 • 连续发生异常情况时请更换变频器
PF Input Pha Loss	**主回路电压异常** 主回路直流电压在再生状态以状态有异常被动。(L8-05设定为"有效"时检出)	• 输入电源发生了缺相 • 发生了瞬时停电 • 输入电源的接线端子松动 • 输入电源的电压变动太大 • 相间电压的平衡太差	调查原因，实施对策后复位

★ =出厂设定值

异常表示	内容	原因	对策
LF Output Pha Loss	**输出缺相** **变频器输出侧发生了缺相** (L8-07设定为有效时检出)	• 输出电缆断线了。 • 电机线圈断线了。 • 输出端子松动。	调查原因,实施对策后复位
		使用的电机功率是变频器最大适用电机功率的1/20以下	重新选定变频器功率或电机功率
OH(OH1) Heatsink Over tmp	**散热片过热** 变频器散热片的温度超过了L8-02的设定值或105度	周围温度太高	设置冷却装置。
		周围有发热体	去除发热源。
		变频器的冷却风扇停止运行	更换冷却风扇（请与本公系）。
	变频器内部冷却风扇停止(18.5KW以上)	变频器的冷却风扇停止运行（18.5KW以上）	
RH Dyn Brk Resistor	**制动电阻过热** 由L8-01设定的制动电阻的保护已动作	减速时间太短，电机再生能量太大。	• 减轻负载。延长减速时间。降低速度。 • 更换新的制动电阻单元
RR Dyn Brk Transistr	**内置制动晶体管异常** 制动晶体管动作异常	—	• 将电源ON/OFF试一下 • 连续发生异常情况时,请更换变频器。
OL1 Motor Overloaded	**电机过负载** 电子热保护引起电机过负载保护动作	负载太大，加减速时间、周期时间太短。	修正负载大小、加减速时间、周期时间。
		V/f特性的电压太高	修正V/f特性
		电机额定电流（E2-01）设定值不适当	确认电机的额定电流值（E2-01）
OL2 Inv Overloaded	**变频器过负载** 由电子热保护、引起变频器过负载保护动作	负载太大，加减速时间、周期时间太短。	修正负载太大,加减速时间、周期时间
		V/f特性的电压太高	修正V/f特性
		变频器功率太小	请换用大容量变频器
OL3 Overtorque Det1	**过力矩1** 电流超过(L6-02)以上并持续(L6-03)时间以上	—	• 确定L6-02.L6-03设定值是否适当 • 确认机械系统使用状况,找出异常原因并解决
OL4 Overtorque det2	**过力矩2** 电流超过(L6-05)以上并持续(L6-06)时间以上	—	• 确定L6-05.L6-06设定值是否适当 • 确认机械系统使用状况，找出异常原因并解决
OS Over speed	**过速度** 速度在设定值(F1-08)以上并持续时间在(F1-09)以上	发生了过冲/不足	再调整增益
		指定速度太高	修正指令　路及指令增益
		F1-08.F1-09的设定值不适当	确认F1-08,F1-09的设定值
		PG的连线断线了.	修理断线处.
PGO PG open	**PG断线检出** 在下列条件时,PG脉冲未被输入的状态已经过了F1-14时间 有PG矢量: 软起动输出≥2% 有PGV/f: 软起动输出≥E1-09	PG的连线有错误.	改正接线.
		没有给PG供电.	正确供电.
		–	确认抱闸(电机)使用时是否打开
DEV Speed Deviation	**速度偏差过大** 速度偏差在设定值(F1-10)以上并持续(F1-11)时间以上	负载太大.	减轻负载.
		加减速时间太短.	延长加速时间.
		负载处在锁定中.	确认机械系统.
		F1-10,F1-11的设定不适当.	确认F1-10,F1-11的设定值.
			确认抱闸(电机)使用时是否打开

★ =出厂设定值

异常表示	内容	原因	对策
SVE Zero Servo Fault	零伺服异常 零伺服运行中,旋转位置却偏离了	力矩极限值过小	增大
		负载力矩过大	减小
		——	检查PG信号的干扰
OPR Oper Disconnect	操作器连接不良 在操作器控制运行指令运行中操作器线断了	——	确认操作器的连接
EF0 Opt External Fit	从通讯选择卡来的外部异常输入	——	检查通讯卡,通讯信号
EF3 External Fault 3	外部故障(输入端子3)		
EF4	外部故障(输入端子4)	从多功能输入处被输入了「外部异常」	・解除从各多功能输入来的外部异常输入 ・消除外部异常原因
EF5	外部故障(输入端子5)		
EF6	外部故障(输入端子6)		
EF7	外部故障(输入端子7)		
EF8	外部故障(输入端子8)		
CPF00 COM-ERR(OP&INV)	操作器传送异常1 电源打开后5秒仍不能与操作器通讯	数字式操作器的端子接触不良	取下一次数字操作器,再重新安装一下
		变频器控制　路不良	更换变频器
CPF01 COM-ERR(OP&INV)	操作器传送异常2 与操作器的通讯开始后,2秒以上传送发生异常	数字式操作器的端子接触不良	取下一次数字操作器,再重新安装一下
		变频器控制　路不良	更换变频器
CPF02 BB Circuit Err	基极封锁　路不良	——	将电源ON/OFF试一下
		控制　路损坏	更换变频器
CPF03 EEPROM　Error	EEPROM不良	——	将电源ON/OFF试一下
		控制　路损坏	更换变频器
CPF04 Internal A/D Err	CPU内部A/D变换器不良	——	将电源ON/OFF试一下
		控制　路损坏	更换变频器
CPF05 External A/D Err	CPU内部A/D变换器不良	——	将电源ON/OFF试一下
		控制　路损坏	更换变频器
CPF04 Internal A/D Err	CPU内部A/D变换器不良	——	将电源ON/OFF试一下
		控制　路损坏	更换变频器
CPF05 External A/D Err	CPU内部A/D变换器不良	——	将电源ON/OFF试一下
		控制　路损坏	更换变频器
CPF06 Option Error	选择卡连接异常	选择卡的端子接触不良	电源OFF后再插入
		变频器或选择卡不良	更换不良品
CPF20 Option A/D Err	选择卡异常	选择卡的端子接触不良	电源OFF再插入
		选择卡的A/D变换器不良	换一块选择卡
CPF21 Option CPU down	传送选择卡的自己诊断异常	选择卡的故障	交换选择卡
CPF22 Option Type Err	传送选择卡的机种形式异常		
CPF23 option dpram err	传送选择卡的相互诊断不良		

★ =出厂设定值

6.1.2 警告(报警)检查

警告是变频器保护动作,但故障接点不动作,消除了原因之后,便自动恢复到原先的状态。数字操作器将表示,多功能输出的(报警)输出,发生了警告时,按表查找原因,实施适当的措施。

警告(报警)表示和对策

警告表示	内容	原因	对策
EF (BOINKING) EXTERNAL FAULT	正转,反转指令同时输入正转指令和反转指令,同时被输入了(0.5秒以上)。	—	修正正转,反转指令的顺序控制 ※发生这样的报警时,电机减速停止(因为旋转方向不知道)
UV (BOINKING) DC BUS UNDERVOLT	**主回路低电压 。** 运行信号还未输入时,已处在以下状态了。 主路直流电压已低于(L2-05)低电压检出电平。抑制浪涌电流用的开关已开了。控制电源处于(CUV电平)低电压以下。	参照故障显示UV1,UV2 UV3, 的原因。	参照故障显示UV1,UV2,UV3的对策。
OV (BOINKING) OVERVOLTAGE	**主回路过压。** 主回路直流电压检出值超过了电压400V级:约800V	电源电压太高。	在电源规格范围内降低电压。
OH (BLINKING) HEATSINK OVER TMP	**散热片过热** 变频器散热片的温度超过了L8-02的设定值	周围温度太高。 周围有发热体。 变频器的冷却风扇已停止旋转	设置冷却装置 去除发热装置 更新冷却风扇(请与本公系)。
OH2 (BOINKING) OVERTORQUE DET 1	**变频器过热预告** 多功能输入端子[变频器过热预告OH2]已输入了。	—	解除从多功能端子的变频器过热预告。
OL3 (BLINKING) Overtorqeue Det 1	**过力矩1** (L6-02)设定值以上的电流已持续了(L6-03)以上的时间。	—	• 确认L6-02,L6-03的设定是否适当。 • 确认机械使用状况,去除异常内容。
OL4 (BLINKING) Overtorque Det 1	**过力矩2** (L6-05)设定值以上的电流已持续了(L6-06)以上的时间。	—	• 确认L6-05, L6-06的设定是否适当。 • 确认机械使用状况,去除异常内容。
OS(blinking) Overtorque Det1	**过速度** (F1-08)设定值以上的速度已持续了(F1-09)以上的时间.	发生了过冲/不足 指令速度过高. F7-08,F1-09的设定值不适当	再调整增益. 修正指令 路及指令增益. 确认F1-08,F1-09的设定值.
PGO(blinking) Pgopen	**PG断线检出** 变频器有频率输出 但PG脉冲没有被输入.	PG接线断线. PG接线错误. PG处没有供电源	修理断线处. 重新接线. 正确供电.
DEV(boinking) Speed Deviation	**速度偏差过大** (F1-10)设定值以上的速度偏差持续 了9F1-11)规定时间以上.	负载太大. 加减速时间太短. 负载处在锁定状态. F1-10,F1-11的设定值不适当.	减轻负载. 延长加减速时间. 确认机械系统. 确认F1-10,F1-11的设定值.

★ =出厂设定值

警告表示	内容	原因	对策
EF3 (blinking) External Fault3	外部异常（输入端子3）	从多功能输入处[外部异常]被输入了。	• 解除从各多功能输入的外部异常输入 • 消除外部异常的原因。
EF4 (blinking)	外部异常（输入端子4）		
Ef5 (blinking)	外部异常（输入端子5）		
EF6 (blinking)	外部异常（输入端子6）		
EF7 (blinking)	外部异常（输入端子7）		
Ef8 (blinking)	外部异常（输入端子8）		
CE MEMOBUS Com Err	传送出错 接受到1次控制信号后,2秒中内不能正常受信.	-	检查传送设备,传送信号
BUS Option Com Err	选择传送出错 设定从选择卡来的运行指令或频率指令方式,发生了出错.	-	检查传送卡,传送信号
CALL SERIAL Com Call	SI-B传送出错 电源投入时,控制信息不能正常接受.	-	检查传送设备,传送信号
E-15 Si-F/G Com Err	SI-F/G传送出错检出中 设定从选择卡的运行或频率指令,E1-15一选择了继续运行时检出出错.	-	检查传送信号
EF0 Opt External Fil	SI-K2以外的传送卡的外部异常检出中 EF0的动作选择中选择了继续运行从选择卡来的外部异常已经输入.	-	消除外部异常的原因

★ =出厂设定值

6.1.3 操作出错

参数设定后,超出设定值的范围及各参数间相矛盾时,将出现操作出错。
在参数正确设定以前,变频器不能起动。(报警输出异常接点输出不动作)。
发生操作出错情况时,根据表中所列原因,调查一下,变更参数。

操作出错显示和设定异常内容

显示	内容	对策
OPE01	变频器功率设定异常	设定变频器功率,与本机不符合(请与本公 系)
OPE02 Limit	参数的设定范围不良	设定了设定范围外的值
OPE03 Terminal	多功能输入选择不良	在多功能输入(H1-01~H1-06)的设定; ·在多功能输入有2个以上相同的值被设定了。 ·UP指令和DOWN指令未同时被设定。 ·UP/DOWN指令与保持加减速停止指令被同时设定了。 ·外部搜索指令(最高输出频率)与外部搜索指令设定频率被同时设定。 ·基极封锁指令NO/NC被同时设定了。 ·PID控制(b5-01)为有效,却设定了UP/DOWN指令。 ·H3-09[频率指令(电流)端子14功能选择]的设定为除了"1F"以外(频率指令),还设定了"频率指令" 端子13/14端子选择。 ·未同时设定+速度指令和-速度指令。 ·同时设定了非常停止指令NO/NC。
OPE05 Sequence Select	选项指令选择不良	在参数b1-01(频率指令的选择)设定为"3"(选项),但却未接上选项卡(C选项)。
OPE06 PG Opt Missing	多功能模拟量输入选择不良	·在参数A1-02(控制方式选择)设定为"1"(有PG V/f 控制方式),但却未接上PG速度控制卡 ·在参数A1-02(控制方式)设定为"3"(有PG矢量控制方式),但却未接上PG速度控制卡.
OPE07 ANALOG SELECTION	多功能模拟量输入选择不良	·H3-05和H3-09被设定为相同的值(除"1F"外)。 ·使用模拟量指令卡A1-14B, F2-01的设定值为"0",并且在多功能输入(H1-01~H1-06)设定为"2"(选择/变频器切换) ·H3-05和H3-09参数设定为2和D(2和D不能同时设定)
OPE08 ELEVATOR TABLE	参数选择不良	设定了当前控制方式下不使用的参数。 (例)在PG矢量控制使用的功能,却选择了无PG矢量控制参数。
OPE10 V/F PTRN SETTING	V/f数据设定不良	E1-04,06、07,09没有满足以下条件 ·EP-04 (FAMX)≥E1-06(FA)>E1-07(FB)≥ E1-09(FMIN)
OPE11 CARRFRG /ON /DELAY	参数设定不良	以下其中任意一个发生了设定不良。 ·载波频率上限(C6-01)>5KHz。且载波频率下限(C6-02)≤5KHz。 ·载波频率比例增益 (C6-03) >6却设定了(C6-02)>·(C6-01) ,C6-01~03,C8-15的上下限出错。
ERR EEPROM RNV ERR	EEPROM写入不良	EERPOM写入时不匹配 ·电源ON/OFF试一下。 ·再一次,修正设定参数。

★ =出厂设定值

6.2 故障分析

系统起动时,由于参数设定及接线错误,变频器及电机未能按所想象的那样动作。 这样的场合,请参照本项,实施适当的对策。有故障内容显示的场合请参照保护诊断功能。

6.2.1 参数不能设定

■ 按了增加键和减小键,显示仍不变

1. 密码不一致(仅在已设定了密码的情况)。
   - A1-04(密码)和A1-05(密码)的设定的数值不一致时,环境设定方式的部分参数不能变更请再设定密码。
   - 密码被记忆时,在A1-04的显示中,在按下RESET键的同时,按一下MENU 键那么A1-05[密码(SET)]显示出来。请再设定密码,(再设定的密码请输入到A1-04中)
2. 参数写入的许可OFF被输入
   - 在多功能输入,设定了[参数写入许可(设定值:7B)]情况下发生,参数写入许可的输入为OFF时,参数不能变更,只有参数写入许可的输入为ON时,才能设定参数。
3. 变频器在运行中(驱动方式)
   - 变频器在运行中,有不能设定的参数,请将变频器停止再设定。

■ 显示OPE01~11

- 参数设定异常, 操作出错,请修正。

■ 显示CPF00~01

- 数字操作器的通信异常,数字操作器和变频器之间的连接有异常,将操作器取下一次,再安装上。

6.2.2 电机不转

■ 按下操作器的运行键, 电机也不转

1、运行方法的设定有错误
   - b1-02(运行指令的选择)的设定为"1"(控制回路端子)场合,按了RUN 键,电机仍不转。按下LOCAL/REMOTE,或切换操作器的操作(*),请在 b1 -02参数设定为"0"(数字操作器)。LOCAL/REMOTE键,请设定o2-01有效("1")/无效("0")。LOCAL/REMOTE键,在驱动模式输入时有效。

2、未处在驱动模式
   - 未处在驱动模式,变频器在准备状态,不能起动,请按下MENU键,显示驱动模式,再按下READ/WRITE键,进入驱动模式。

3、频率指令太低
   - 频率指令低于最低输出频率(E1-09)情况时,变频器不运行。请变更频率指令,使它大于最低输出频率(相关参数:b1-05,E1-09)

4、多功能模拟量输入的设定异常
   - 多功能模拟量输入(H3-05, H3-09)设定了"1"(频率增益),电压(电流)没有输入,频率指令为零,请确认设定值及模拟量输入值是否适当。

5、在多段速运行状态,频率指令2设定了,辅助频率指令未输入
   - 在多功能模拟量输入(H3-05),设定为"0"(辅助频率指令)并使用多段速指令的场合。辅助频率指令作为频率指令2使用。请确认设定值及多功能输入值(端子16)是否适当。

6、在多段速运行状态,已有了频率指令2的数字量设定,但多功能模拟量输入(H3-05未设定在"1F"。
   - 在多功能模拟量输入(H3-05),设定为"0"(辅助频率指令),并使用多段速指令的场合。辅助频率指令作为频率指令2使用。
   - 请确认多功能模拟量输入法(H3-05)是否为"1F"及频率指令2的设定值是否适当

■ 输入了外部运行信号, 电机仍不转。

1、运行方法的选择有错
   - 如果b1-02(运行指令的选择)的设定为"0"(数字操作器),即使输入了外部运行信号,电机也不转,请在B1-02设定为"1"(控制回路端子)
   - 按下了LOCAL/REMOTE键,已切换到操作器操作的场合,同样电机还不转则一次按下了LOCAL/REMOTE键,切换到原先的设定。

     ※LOCAL/REMOTE键,请设定02-01有效"1"/无效"0"

     LOCAL/REMOTE键在驱动模式输入时有效

2、3线制程序状态
   - 正转/停止,反转/停止的运行场合(2线制),与3线制场合的输入方式不同,设定为3线制时,即使在正转/停止,反转/停止的相应输入端子ON,电机也不会动作。

★ =出厂设定值

• 3线制状态下让其动作的场合,请在确认了3线制时序图基础上,输入正确的信号。
• 2线制状态下让其动作的场合,在多功能输入(H1-07-H1-06)设定除了"0"以外的值。

3、未在驱动模式
• 未在驱动模式时,变频器处于准备,不起动。按了MENU键,显示驱动模式,再按一下WRITE键,则处于驱动模式。

4、 频率指令太低
• 频率指令低于最低输出频率(E1-09)时,变频器不运行。请变更频率指令,使之大于最低输出频率以上(相关参数:b1-05,E1-09)

5、多功能模拟量输入的设定异常
• 多功能模拟量输入(H3-05,H3-09)设定为"1"(频率增益),电压(电流)未输入频率指令成为零,请确认设定值及模拟量输入值是否恰当。

6、 在多段速运行状态,频率指令2设定了,辅助频率指令未输入
• 在多功能模拟量输入(H3-05),设定为"0"(辅助频率指令),并使用多段速指令。辅助频率指令作为频率指令 2使用。请确认设定值及多功能输入值(端子16)是否适当。

7、在多段速运行状态,已有了频率指令2的数字量设定,但多功能模拟量输入(H3-05)未设定在"1F"
• 在多功能模拟量输入(H3-05),设定为"0"(辅助频率指令),并使用多段速指令。辅助频率指令作为频率指令2使用。
• 请确认设定值及多功能输入(H3-05)是否为"1F",及频率指令2的设定值是否 适当。

■ **加速时及连接了负载时,电机停转**

• 负载太大。变频器虽然有失速防止功能及全自动力矩提升功能,但加速度太大及负载太大,电机超过了功率范围。请延长加速时间,减小负载,考虑加大电机功率。

■ **电机只能向一个方向旋转**

• 选择了反转禁止,当反转禁止(b1-04)设定为"1"时,变频器不接受反转指令。正转,反转两方向都要使用时, 请将参数B1-04设定为"0"。

6.2.3 电机的旋转方向相反

• 电机输出线的接线错误原因。若变频器的U、V、W和电机的U、V、W接线正确,正转指令时,电机正转。由于电机的正转方向由制造厂家及机种决定,所以请确认接线方式 。U、V、W中 的2根线接线互换,旋转方向就会相反。

6.2.4 电机的力矩输出不足/加速时间太长

■ **已处于力矩极限状态**

• 设定了力矩极限(L7-01,L7-04)参数,由于不能输出设定值以上的力矩,会出现力矩不足,或加速时间延长的情况,请确认力矩极限值设定是否适当。
• 在多功能模拟量输入(H3-05,H3-09)参数设定了力矩极限(设定值:10~13)情况时,请确认多功能输入值是否适当。

■ **加速中失速防止级别太低**

• 加速中失速防止级别(L3-02)的设定值过低,加速时间将会延长。请确认设定值是否适当。

运行中失速防止级别太低

• 运行中失速防止级别(L3-06)的设定值过低,力矩输出前的速度将会降低,请确认设定值是否适当。

■ **矢量控制状态,自学习还未实施**

• 自学习还未实施情况下,得不到矢量控制的性能。对电机实施自学习,或通过计算可设定的电机参数。或变更控制方式选择(A1-02)为V/F控制。

6.2.5 电机转速超过频率指令/电机不按指令设定值旋转

■ **电机转速超过频率指令**

1. 模拟量频率指令的偏置设定有异常(增益设定也同样)频率指令的偏置设定(H3-03),被加算到频率指令上,请确认设定值是否适当。
2. 多功能模拟量输入参数中被设定了频率偏置在多功能模拟量输入(H3-05,H3-09)参数中被设定"2"(频率偏置),输入电压(电流)所对应的频率补加算到频率指令上。请确认设定值及模拟量 输入值是否适当。
3. 在频率指令(电流)端子14,信号已被输入在频率指令(电流)端子14功能选择(H3-09)已设定为"1F"的频率指令,端子14的输入电压(电流)所对应的频率被加算到频率指令上。请确认设定值及模拟量输入值是否适当。

★ =出厂设定值

■ 电机不按指令设定值旋转

• 在力矩控制方式。力矩控制选择(d5-01)参数,设定为"1"(力矩控制)场合,则不能进行速度控制（可设定速度极限）。想要切换速度控制和力矩控制时

• d5-01(力矩控制选择)="0"(速度控制)

• 请设定在H1-01-H1-06(多功能输入)中的一个="71"(速度/力矩控制切换)

6.2.6 滑差补偿功能的速度控制精度太低

• 滑差补偿已达到了极限。滑差补偿功能不能超过滑差补偿极限(C3-03)。请确认设定值是否适当。

6.2.7 无PG矢量控制方式情况，高速旋转时的速度控制精度太低

• 电机额定电压太高

• 变频器的输出电压,由变频器的输入电压的最大值来决定。矢量控制计算结果,输出电压指令值超过变频器的输出电压最大值时，速度控制精度将下降。设定C3-06=1，或者请使用额定电压低的电机(矢量控制专用电机)。

6.2.8 电机的减速太慢

■ 连接了制动电阻,减速时间仍太长

1.已设定了"减速中失速防止功能"

• 连接了制动电阻场合,在L3-04参数(减速中失速防止功能选择)设定为"0"(无效)或者"3"(附电阻减速失速防止)。选择"1"(有效:出厂设定)时,制动电阻不能充分发挥功能。

2.设定的减速时间太长

• 请确认设定的减速时间(C1-02,C1-04,C1-06,C1-08)

3.电机的力矩不足

• 参数正常,过电压故障也未发生的场合,是处在电机的能力界限上,请考虑增大电机的容量。

4. 达到了力矩极限

• 力矩极限(L7-01-L7-04)已设定，由于不能输出在此以上的力矩,会延长减速时间,请确认力矩极限值是否适当。

• 在多功能模拟量输入(H3-05,H3-09)设定了力矩极限(设定值:10-13)。请确认模拟量输入是否适当。

■ 升降机用负载在实施制动时滑落

• 程序器不良

• 变频器在减速结束后0.5秒内进入直流制动状态(出厂设定)。

• 为了确保制动保持,在多功能接点输出端子(9-10),设定频率检出2(H2-01=5)。输出频率L4-01(3.0~5.0Hz)以上"开"(L4-01)以下时"关"。

• 由于在频率检出2有滞后现象(L4-02=2.0Hz)。因此停止时有滑落场合,请以0.5Hz为单位变更。另外制动的开/关信号在运行中信号(H2-01=0)请勿使用。

6.2.9 电机过热

■ 负载太大

• 电机的负载太大,实际力矩超过了电机的额定力矩状态并长时间使用的话，电机便发热。在电机的额定值中,除了连续额定值以外还有短时间额定值参数。减轻负载或延长加减速时间。适当增加电机功率。

■ 周围温度太高

• 电机的额定值由使用周围的温度来决定，在超过周围使用温度环境下持续额定力矩运行电机也会烧坏,请降低电机的周围温度至许可范围内。

■ 电机的相间耐压不足

• 变频器的输出与电机连接，变频器的开关动作会使电机绕组线圈间产生冲击电压。通常，最大的冲击电压会达到变频器输入电源的3倍程度(400V级为1200V)。请使用电机相间的冲击耐压高于最大冲击电压电机。400V级的变频器,推荐使用变频器专用电机。

■ 用矢量控制方式,还未实施自学习

• 未实施自学习的场合,便得不到矢量控制的功能。要么对电机实施自学习,要么通过计算设定电机参数,或者在控制方式选择A1-2参数变更为V/F控制。

6.2.10 一旦起动变频器,控制装置便有干扰/调幅收音便出现杂音

• 由于变频器的开关动作而发生噪声时,请施行如下对策。
• 请降低变频器的载波频率(C6-01),由于减少了内部的开关动作的次数,会有一定的效果。
• 请在变频器的电源输入侧设置噪声滤波器。
• 请在变频器的输出侧设噪声滤波器。
• 电缆的外面套上金属管,金属对杂波有屏蔽作用,请在变频器的周围用铁箱屏蔽
• 主　路接线和控制接线分离走线。

6.2.11　一旦变频器运行,漏电断路器便动作

• 由于变频器内部以高速开关状态运行,因此有漏电流,会引起漏电断路器动作而切断电源。请改用漏电检出值较高的断路器(1台相当于感度电流200mA以上,动作时间0.1秒以上)或使用防高次谐波的断路器(变频器用)。降低载波频率(C6-01) 会有一定效果。另外电缆太长出会增加漏电流。

6.2.12　机械的振动

■　机械有轰鸣声

1. 机械系统所固有的振动频率与载波频率发生共振
• 电机的动作没有问题,机械发出尖锐的共振声音时,是由于机械系统所固有的振动频率与载波频率发生了共振。请调整载波频率(C6-01、C6-03)避开共振频率。
2. 机械系统所固有的振动频率与变频器输出频率共振
• 在参数(d3-01、d3-04),设定禁止频率(跳跃功能),避开共振频率。另外在电机底板上设置防振橡胶。

■　无PG矢量控制时的振动/振荡

• 增益调整不足,请顺序调整力矩补偿的一次延迟时间参数(C4-02),AFR增益(C8-08),滑差补偿一次延迟时间参数(C3-02),设定效果较好的增益,降低增益的设定值,增大一次延迟时间参数的设定值。
• 未实施自学习,就得不到矢量控制的性能,请对电机单体实施自学习或者通过计算设定参数,或者在方式选择(A1-02),变更为V/f控制。

■　V/f控制的振动/振荡

• 增益调整不足,请顺序调整力矩补偿的一次延迟时间参数(C4-02),乱调防止增益(C7-02)。滑差补偿一次延迟时间参数(C3-02),再设定效果较好的增益。降低增益的设定值,增大一次延迟时间参数的设定值。

PID控制振动/振荡

• 是PID控制的增益调整不足。请确认振动的周期,调整P、I、D的各动作。

矢量控制还未实施自学习

• 未实施自学习的场合,矢量控制的性能便得不到。对电机进行自学习或者通过 计算设定,或者在方式选择(A1-02)变更为V/f控制。

6.2.13　变频器的输出即便停止,电机仍旋转

• 停止时电流制动不足,实行了减速停止电机仍不能完全停止或很慢地空转。这是由于直流制动不充分,请按 如下方法调整直流制动。
• 增大直流制动电流(b2-02)的设定值。
• 增大停止时直流制动电流制动时间(b2-04)的设定值。

6.2.14　风机起动时,检出失速/OV

• 发生在风机起动时,已经在空转的场合,是起动时直流制动不足。
• 用直流制动先将旋转中的风机停止,再起动,可以防止OV发生及失速。并请增大起动时直流制动时间(b2-03)的设定值。

6.2.15　输出频率到指令频率为止不再上升

■　指令频率在设定禁止频率的范围内

• 使用设定禁止频率(跳跃功能)的场合,在设定禁止频率的范围内输出频率不变化。
• 请确认设定禁止频率1~3(d3-01~d3-03)及设定禁止频率幅度(d3-04)的设定是否适当。

超过频率上限值

• 输出频率的上限值是最高输出频率(E1-04)×频率指令上限值(d2-01)/100。
• 请修正E1-04、d2-01的设定值。

第七章 保养检查

7.1 保养与检查

变频器保修期间按如下规定

保修期间:出厂后18个月内或交给最终用户1年内。

7.1. 日常检查

在系统正常动作状态,请确认如下项目

- 电机是否有异常声音及振动
- 是否有异常发热
- 周围温度是否过高
- 输出电流监视显示是否与额定值相差很大
- 变频器下部安装的冷却风扇是否正常运转。

7.1.2 定期检查

定期保养时,请确认以下项目。

检查时,一定要切断电源并chang灯全部熄灯后,经过1分钟(30KW以上的变频器3分钟以上)后再进行,切断电源后触摸端子,会有触电的危险。

定期检查项目

检查项目	检查内容	异常时的对策
安装外部端子,单元的螺丝钉,接插件	螺丝是否松动	拧紧
	连接器是否松动	拧紧,重装
散热片	垃圾及灰尘是否堆积?	用39.2X10^{4}~58.8X10^{4}帕(4~6kgcm^{2}压力的干燥压缩空气吹掉)
印刷基板	有否导电灰尘及油腻吸附	用39.2X10^{4}~58.8X10^{4}帕(4~6kgcm^{2}压力的干燥压缩空气吹掉)
冷却风扇	异常声音异常振动有吗? 累计运行时间切勿超过2万小时	更换冷却风扇
功率元件	是否有灰尘垃圾吸附	用39.2X10^{4}~58.8X10^{4}帕(4~6kgcm^{2}压力的干燥压缩空气吹掉)
滤波电解电容	有异常如:变色、异臭吗?	如果不能去除,应更新印刷基板。

7.1.3 部品的定期保养

变频器有很多部品组装构成,由于这些部品的正常动作才能发挥原来的功能。电子零部件中,根据使用条件,有的需要保养。为了使长时期持续正常动作,有必要根据这些部品的使用寿命,配合进行定期检查,部品更换,引自JEMA发行(通用变频器定期检查的介绍)。定期检查的间隔时间,根据变频器的设置环境和使用状况有所不同。变频器的保养期限如下表示,请作参考。

部品更换预定时间(参考)

部品名	标准更换所数	更换方法及其他
冷却片	5年	更换新的
滤波电解电容	5年	更换新的(调查后决定)
制动继电器	—	检查后决定
保险丝	10年	检查后决定
印刷基板上的铝介质电容	5年	更换新基板(检查后决定)

(注) 使用条件

- 周围温度年平均30℃
- 负载系数80%以下
- 工作时间每天12小时以下

★ =出厂设定值

第八章 规格

8.1 变频器的标准规格

型号 YD3 □		1P5	2P2	3P7	5P5	7P5	011	015	018	022	030	037	045	055	075	093	110	132	160	185	200	220	250	280	315	355	400	450	500	560	630
适用电机功率 * 1KW		1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	93	110	132	160	185	200	220	250	280	315	355	400	450	500	560	630
额定	输出功率KVA	3.7	4.7	6.1	11	14	21	26	31	37	50	61	73	98	130	140	170	200	230	260	300	340	380	430	460	490	519	585	650	722	780
	额定输出电流A	4.8	6.2	8	14	18	27	34	41	48	65	80	96	128	165	180	224	260	302	340	380	450	470	530	605	670	738	864	984	1100	1185
输出	最大输出电压	三相380/400/415/460V(对应输入电压)																													
	额定输出频率	由参数设定最高400Hz可对应																													
电源	电压、频率	三相380/400/415/440/460V 50/60Hz																													
	允许电压波动	+10%,-15%																													
	允许频率波动	-5%																													
控制特性	控制方式	电流矢量正弦波PWM																													
	起动力矩	150%/1Hz																													
	速度控制范围	1:100																													
	速度控制精度	矢量控制时，±0.2%																													
	速度应答	5Hz																													
	力矩极限	有(用参数设定,可在4象限切换)																													
	力矩精度	±5%																													
	频率控制范围	0.1～400Hz																													
	频率精度（温度波动）	数字式指令±0.01%(-10° C ~+40° C) 模似量指令±0.01%(25° ±10° C)																													
	频率设定分辨率	数字式指令0.01Hz 模似量指令0.03Hz/60Hz(11bit+符号)																													
	输出频率分辨率（演算分辨率）	0.001Hz																													
	过负载能力	150% 1分钟，180% 立即停止																													
	频率设定信号	-10~+10V / 0~+10V / 4~20mA																													
	加减速时间	0.01~6000.0秒(加速减速个别设定.....4种切换)																													
	制动力矩	约20%																													
保护功能	电机保护	有电子热保护																													
	瞬时过电流	额定输出电流的约200%以上瞬时保护																													
	过负载	额定输出电流的150%,1分钟																													
	过电压	主回路电压820V以上时停止																													
	欠电压	主回路电压380V以下时停止																													
	瞬时停电补偿	15ms以上时.停止(出厂设定) 由运动方式选择,约2秒内的停电恢复时,继续运行																													
	散热风扇过热	由热敏电阻保护																													
	失速防止	加减速中运行中失速防止																													
	接地保护	有电子回路保护(过电流级别)																													
	充电中表示	主回路直流电压降到50V以下表示																													
环境	周围温度	-10°C ~ +40°C (封闭挂壁型)/-10°C ~ +50°C (柜内安装型)																													
	湿度	90%RH以下																													
	保存温度	-20°C ~ +60°C																													
	使用现场	室内(无腐蚀性气体,尘埃的地方)																													
	海拔高度	1000M以下																													
	振动	10~20Hz未满9.8m/S²(1G),20~50Hz2m/S²(0.2G)																													

*1 最大适用电机功率,更加严格的选定方法是选择变频器额定电流必须大于电机额定电流。

*2 也有必要调整的情况。

★ =出厂设定值

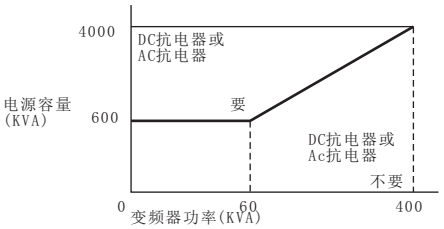
第九章　附　　录

9.1　变频器适用上的注意

9.1.1　选定

■ **电抗器的设置**

将变频器接在大功率电源变压器(600kVA以上)时,有进相电容切换时电源输入　路会有过大的峰值电流流过,会损坏变频器的整流部分。这种情况请设置DC电抗器成AC电抗器(外接)。电源侧的功率因数也会有所改善。



■ **变频器的容量**

1台变频器驱动1台特殊电机或驱动2台以上电机时,电机额定电流合计的1.1倍要小于变频器额定输出电流,请选定合适的变频器的容量。

■ **起动力矩**

电机的起动,加速特性,受到变频器的过负载额定电流的制约。与一般用电源相比力矩特性值要小一些。如果要使用在起动力矩大的场合,请提高一档变频器容量或同时加大电机和变频器功率容量。

■ **非常停止**

变频器发生故障时,保护功能动作使输出停止,但是这时不可让电机急停止。因此,请设置非常停止所需要的机械设备(机械式停止,保持机构)

■ **专用选择(外接)**

端子B1,B 2,⊖ ,⊕ 为专用选择的连接端子,专用选择以外装置切勿连接。

9.1.2　设置

■ **柜内安装**

请避开油腻风棉,尘埃等浮游物多的恶劣环境,设置在较清洁的场所,或者安装在浮游物无法侵入的(全封闭形)柜内。柜内安装,要有维持变频器允许温度以下的冷却方式及柜内空间,并且不能将变频器安装在木材等可燃性材料上。

■ **安装方向**

请纵向,挂壁式安装。

9.1.3　设定

■ **上限极限**

由数字操作器设定,最大可400Hz以上高速运转,若错误设定将造成危险,请利用上限频率设定功能设定上限极限,(出厂设定的最大输出频率为60Hz)

■ **直流制动**

直流制动动作电压及动作时间的设定值过大,是电机过热的原因。

■ **加减速时间**

电机的加速时间,根据电机的发生力矩与负载力矩的惯性力矩($GD^2/4$)来设定。加减速中防止失速功能动作的场合,请延长加减速时间。已发生了失速防止动作时,只延长已动作那部分加减速时间.如想再缩短加减速时间,请同时加大电机及变频器的容量(功率)

9.1.4　使用

■ **接线检查**

将电源接入变频器的输出端子U、V、W 会使变频器受损。电源投入前请检查接线有否错误,并仔细检查接线及顺序控制线路。

■ **电磁接触器的设置**

在电源侧设置电磁接触器(MC),请勿频繁地使这个MC起动,停止,因为这会导致变频器故障。

★ =出厂设定值

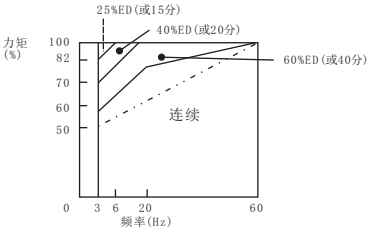
■ **检查**

变频器的电源被切断,内置电解电容器放电仍需时间。待充电指示灯熄灭后再进行检查。

9.2 电机适用上的注意

9.2.1 已有标准电机的适用

标准电机用变频器驱动,与商用电源驱动相比,产生的损失有所增加。更有在低速段的冷却效果变差,电机的温度上升,除了本公司的标准电机以外,在低速段请降低负载力矩。一般的标准电机的允许负载特性如下图所示,然而在低速段有必要输出100%连续的力矩场合,请采用本公司标准电机,变频器专用电机,甚至矢量专用电机。



另外,输入电压较高及接线距离较长的场合,必须要考虑电机的绝缘耐压。

■ **高速运转**

使用在60Hz以上高速场合,会发生动态平衡及轴承的寿命等不适合问题。

■ **力矩特性**

变频器驱动和商用电源驱动,电机的力矩特性是不同的,请确认对方机械的力矩特性。

■ **振动**

由于采用高载波调整方式PWM控制,电机的振动已经很小,几乎与商用电源驱动同等级别,但是在如下情况时,也会有大的振动。

与机械系统的固有频率发生共振在一定速度运行机械改为可变速运行时,会有共振的可能,请在电机的基板下贴上防振 橡胶,或进行频率跳跃控制,也许会有效。旋转体自身残留的不平衡,60Hz以上高速运行时,特别要注意。

■ **噪声**

几乎等同与商用电源驱动,但额定转速以上(60)运行时,有显著的风扇声音。

9.2.2 适用于特殊电机

■ **极数变换电机**

与标准电机相比,额定电流有所不同,在确认了电机最大电流后,再选用变频器。极数的切换,请一定在电机停止时进行。如果在运转中切换,则再生过电压或者过电流保护 路动作,使电机按自由滑行方式停止。

■ **水中电机**

电机的额定电流与标准电机相比大些,变频器的功率选定时请注意。另外电机和变频器之间的接线距离太长时,电压降使电机的最大力矩降低,因此,请使用粗一些的电缆连线。

■ **防爆型电机**

驱动耐压防爆型电机及安全增强防爆型电机时,必须将电机和变频器组合接受防爆鉴定,驱动已有的防爆型电机也同样。然而变频器本身为非防爆型构造,请设置在安全的地方。

■ **齿轮减速电机**

根据润滑方式及制造厂标准,连续使用旋转范围有所不同。特别是油润滑的情况,仅在低速范围连续运转,会有烧焦的危险。另外,60Hz超高速使用时,请与制造厂协商。

■ **同步电机**

起动电流及额定电流比标准电机大得多,选用变频器时,请咨询。群控(变频器1台,电机多台)状态时,多台同步电机分别地进入,退出时,会发生脱离同步。

■ **单相电机**

单相电机不适合用变频器来控制运转。在电解电容起动方式中,变频器引起的高次谐波电流会使电解电容受损坏。分相起动方式及离心式起动方式由于内部的离心力开关不动作,起动线圈会有烧坏的可能,请换成三相电机使用。

★ =出厂设定值

9.2.3 动力传动结构(减速机、皮带、链条等)

动力传动系统采用油润滑方式的齿轮箱及变减速机等情况时,仅在低速时连续运行油润滑会变得很不好。另外,60Hz超高速运行,动力传动结构的噪声、寿命、离心力等会引起强度问题发生。

9.3 周边设备上适用的注意

接线用断路器的设定和选定

在变频器的电源侧,为了保护接线,请设置用断路器(MCCB)。MCCB的选定要根据变频器电源侧功率因素(随电源电压,输出频率,负载而变化)。关于标准选定请来咨询。完全电磁型的MCCB,其动作特性因高次谐波电流而变化,因此有必要放大功率。推荐使用变频器漏电保护器。

电源侧电磁接触器

在变频器的电源侧,不使用电磁接触器也可以工作。在端点控制运行的场合,(即使为了防止瞬时停电等原因停机之后,复电时的自动再起动而引起的事故为目的)在电源侧设置MC,也请不要MC频繁地起动、停止否则可能会造成故障。用数字操作器运行的场合,由于复电后不能自动再起动,因此用MC不能起动,电源侧用MC使变频器停止,变频器特有的再生制动不动作,将自由滑行停止。或者使用制动单元及制动电阻单元的场合,请将制动电阻单元的热保护接点在顺控器里将MC设计成OFF。

电机侧电磁接触器

原则上,变频器与电机之间不要设置电磁接触器,并在运行中切勿ON/OFF动作,变频器在运行中动作时,很大的浪涌电流流入变频器会引起变频器的过电流保护动作。为了切换电源等原因而必须设置MC的场合,务必让变频器和电机停止后再切换,在运行中要进行切换场合,请选择速度搜索功能。对瞬时停电有保护要求的场合,请使用延迟释放型MC。

热继电器的设置

为了防止由于电机过热而引起故障,变频器本身有电子热保护功能,但是1台变频器驱动多台电机运行的场合及多极电机场合,请在变频器和各个电机之间设置热动型热继电器(THR)及设计热保护接点。这是控制参数L1-01设定为"0",热动型继电器或者热保护接点的设定在50Hz 是电机铭牌值的1.0倍,60Hz是电机铭牌值的1.1倍。

改善功率因素

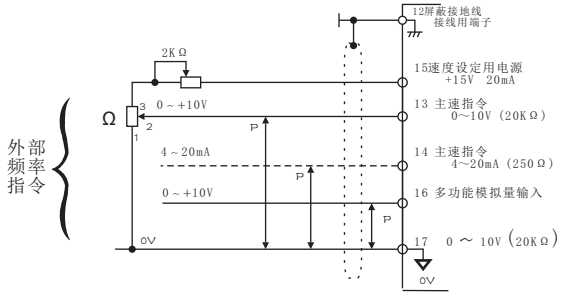
改善功率因素,请在变频器的电源侧设置直流电抗或者交流电抗器(400级18.5-160KW机种已内置了直流电抗器)。变频器输出侧的功率改善用电解电容及浪涌抑制器,由于变频器输出的高次谐波成分,会有过热等受损坏的危险,另外变频器过电流时过电流保护动作,因此请勿设置电解电容及浪涌抑制器。

关于电磁波干

变频器输入输出(主回路)由于含有高次谐波成分,因此在变频器的附近使用的通信设备(调幅接受机)会受到干绕。这样的场合,如安装噪声滤波器,可使干绕改善一些。另外,在变频器和电机之间及电源侧的接线用金属管屏蔽并接地会有一定效果。

接线的粗细和接线距

变频器与电机的接线距　较长场台(特别是低频输出时),电缆上的电压降会使电机的力矩降低,请用足够粗的电线接线。数字操作器与本体分　安装使用场　合,请务必使用专用连接电缆选项,模拟量信号长距离操作场合和模拟量操作器或者操作信号源与变频器之间的控制线,请限制在50米以下,并为了不受周边设备的感应,请与强电回路(主回路及继电控器回路)分开接线,且不用数字操作器设定频率而用外部的频率设定时,如下图那样用双股绞和屏蔽线,屏蔽网线不要接大地而接到端子12号上。



★ =出厂设定值

9.4 参数设定一览表

	名称 (液晶画面的表示)	设定范围	设定值	参数NO.	名称 (液晶画面的表示)	设定范围	设定值
A1-00	语言选择	0~6		b5-07	PID偏置调整	-100.~0 +100.0	
A1-01	参数存取级别	0~4		b5-08	PID延迟时间	0.00~10.0	
A1-02	控制方式选择	0~3		b5-09	PID输出特性	0~1	
A1-03	参数初始化	0~3330		b5-10	PID输出增益	0.0~25.0	
A1-04	密码1	0~9999		b5-11	PID逆转选择	0~1	
A1-05	密码2	0~9999		b5-12	反馈丧失检出	0~2	
A2-01 ~ A2-32	用户参数的设定	b1-01 ~ o2-08		b5-13	丧失检出值	0~100	
b1-01	频率指令选择	0~4		b5-14	丧失检出时间	0.0~25.5	
b1-02	运行指令选择	0~4		b6-01	暂停起动频率	0.0~400.0	
b1-03	停止方试选择	0~3		b6-02	暂停起动时间	0.0~10.0	
b1-04	反转禁止	0. 1		b6-03	暂停停止频率	0.0~400.0	
b1-05	低频运行方式	0~3		b6-04	暂停停止时间	0.0~10.0	
b1-06	端子扫描时间	0.1		b7-01	DROOP增益 *2	0.0~100.0	
b1-07	运行方式切换	0.1		b7-02	延迟时间 *2	0.03~2.00	
b1-08	程序模式运行	0.1		b8-01	节能控制增益	0~100	
b2-01	制动开始频率	0.0~10.0		b8-02	开始频率	0.0~400.0	
b2-02	直流制动电流	0~100					
b2-03	起动制动时间	0.00~10.00					
b2-04	停止制动时间	0.00~10.00		c1-01	加速时间1		
b2-08	磁通补偿	0~500		c1-02	减速时间1		
b3-01	起动时搜索	0.1		c1-03	加速时间2		
b3-02	搜索动作电流	0~200		c1-04	减速时间2		
b3-03	搜索减速时间	0.1~10.0		c1-05	加速时间3	0.0~6000.0	
b4-01	On延迟时间	0.0~300.0		c1-06	减速时间3		
b4-02	OFF延迟时间	0.0~300.0		c1-07	加速时间4		
b5-01	PID控制模式	0~4		c1-08	减速时间4		
b5-02	比例增益(P)	0.00~25.00		c1-09	紧急停止时间		
b5-03	积分时间(I)	0.0~360.0		c1-10	时间单位	0.1	
b5-04	积分时间上限	0.0~100.0		c1-11	切换频率	0.0~400.0	
b5-05	微分时间(D)	0.00~10.00		c2-01	加速开始时间	0.0~2.50	
b5-06	PID的上限	0.0~100.0		c2-02	加速结束时间	0.0~2.50	

*1.未实施初始化

*2.根据软件版本,也有不表示的.

*3.出厂设定值随控制方式(A1-02)而不同

★=出厂设定值

参数一览表(继上页)

参数ON	名称(液晶画面的表示)	设定范围	设定值	参数On	名称(液晶画面的表示)	设定范围	设定值
c2-03	减速开始时间	0.00~2.50		d1-03	频率指令3	0~400.0	
c2-04	减速结束时间	0.00~2.50		d1-04	频率指令4		
c3-01	滑差补偿增益	0.0~2.5		d1-05	频率指令5		
c3-02	一次延迟时间	0~10000		d1-06	频率指令6		
c3-03	滑差补偿极限	0~250		d1-07	频率指令7		
c3-04	再生滑差补偿	0.1		d1-08	频率指令8		
c3-05	磁通计算方法	0.1		d1-09	点动频率		
c3-06	输出电压限制	0.1		d2-01	频率上限	0.0~110.0	
c4-01	力矩增益补偿	0.00~2.50		d2-02	频率下限	0.0~109.0	
c4-02	时间延迟	0~10000		d3-01	跳跃频率1	0.0~400.0	
c4-03	正转起动力矩	0.00~200.0		d3-02	跳跃频率2		
c4-04	反转起动力矩	-200.0~0.0		d3-03	跳跃频率3		
c4-05	起动力矩时间	0~200.0		d3-04	跳跃幅宽	0.0~20.0	
C5-01	比例增益1	0.00~300.00		d4-01	频率保持选择	0.1	
C5-02	积分时间1	0.000~10.000		d4-02	指令加减限制 *2	1~100	
C5-03	比例增益2	0.00~300.00		d5-01	力矩控制选择	0.1	
C5-04	积分时间2	0.000~10.000					
C5-05	速度控制极限	0.0~20.0					
C5-06	延迟时间	0.000~0.500					
C5-07	增益切换频率	0.0~400					
C5-08	积分极限	0~400					
c6-01	载波频率上限	2.0~15.0*2		E1-01	输入电压设定	155~255*1	
c6-02	载波频率下限	0.4~15.0		E1-02	电机种类选择	0~2	
c6-03	载波频率增益	00~99		E1-03	V/F曲线选择	0~F	
c7-01	乱调防止选择	0.1		E1-04	最高输出频率	40.0~400.0	
c7-02	乱调防止增益	0.00~2.50		E1-05	最大输出电压	0.0~255.0*1	
c8-08	抑制增益	0.00~10.00		E1-06	基频	0.0~400.0	
c8-09	抑制时间 *2	0~2000		E1-07	中间输出频率	0.0~400.0	
c8-30	载波频率 *2	0~2		E1-08	中间输出电压	0.0~255.0*1	
d1-01	频率指令1	0~400.00		E1-09	最低输出频率	0.0~400.0	
d1-02	频率指令2	0~400.00		E1-10	最低输出电压	0.0~255.0*1	

*1. 出厂设定值因控制方式(A1-02)而不同。

*2. 根据软件版本,也有不表示的。

*3. 设定范围及出厂设定值因变频器容量而不同。

★=出厂设定值

参数一览表(继上页)

参数NO	名称 (液晶画面的表示)	设定范围	设定值	参数NO	名称 (液晶画面的表示)	设定范围	设定值
E1-11	中间频率2 *2	0.0~400.0		F1-06	Pg输出分频比	0-132	
E1-12	中间输出电压2 *2	0.0~255.0*1		F1-07	加减速中积分	0,1	
E1-13	基础电压*2	0.0~255.0*1		F1-08	过速度检出值	0-120	
E2-01	电机额定电流	0.32~6.40*2		F1-09	过速度检出时间	0.32~6.40*2	
E2-02	电机额定滑差	0.00~20.00		F1-10	过偏检出值	0-50	
E2-03	电机空载电流	*3		F1-11	过偏检出时间	0.0-10.0	
E2-04	电机极数	2~48		F1-12	PG 减速齿数1	0-1000	
E2-05	电机线间电阻	0.000~65.000		F1-13	PG 减速齿数2		
2-06	电机漏电阻	0.0~40.0		F1-14	断线检出时间	0.0~10.0	
E2-07	铁饱系数1	0.00~0.50		F2-01	模拟量输入法	0,1	
E2-08	铁饱系数2	0.00~0.75		F3-01	数字量输入法	0~7	
E2-09	电机机械损失	0.0~10.0		F4-01	CH1监视选择	1-38	
E2-10	力矩补偿铁损	0~6553.75		F4-02	CH1监视增益	0.0-2.50	
E3-01	控制方式选择 *1	0~3		F4-03	CH2监视选择	1-30	
E4-01	最高输出频率 *1	40.0~400.0		F4-04	CH2监视增益	0.0-2.50	
E4-02	最大输出电压 *1	0.0~255.0*1		F4-05	CH1监视偏置	-10.0~10.0	
E4-03	基频 *1	0.0~400.0		F4-06	CH2监视偏置	-10.0~10.0	
E4-04	中间输出频率 *1	0.0~400.0		F5-01	CH1输出选择	0.0-37	
E4-05	最低输出电压 *1	0.0~255.0*1		F5-02	CH2输出方式	0.0-37	
E4-06	最低输出频率 *1	0.0~400.0		F6-01	输出模式选择	0,1	
E4-07	最低输出电压 *1	0.0~255.0*1		F7-01	输出脉冲设定	0-4	
E5-01	电机额定电流 *1	0.32~6.40*2		F8-01	(SIF/G)选择 *1	0-3	
E5-02	电机额定滑差 *1	0.00~20.00		F9-01	输入级别选择	0,1	
E5-03	电机空载电流 *1	*2		F9-02	检出方式选择	0,1	
E5-04	电机极数 *1	2~48		F9-03	输入动作选择	0-3	
E5-05	电机线间电阻 *1	0.000~65.000		F9-04	扫描取样时间	0~60000	
E5-06	电机漏电阻 *1	0.0~40.0		F9-05	SI-K2力矩	0~1	
F1-01	PG脉冲数	0~60000		F9-06	其他传送法	0~3	
F1-02	PG断线运动方式	0~3		H1-01	端子3功能选择	0~77	
F1-03	过速运行方式	0~3		H1-02	端子4功能选择	0~77	
F1-04	速差过大方式	0~3		H1-03	端子5功能选择	0~77	
F1-05	Pg旋转方向	0,1		H1-04	端子6功能选择	0~77	

*1. 根据软件版本,也有不表示的
*2. 设定范围及出厂设定值因变频器容量而不同
*3. 出厂设定值随控制方式(A1-02)而不同
*4. 出厂设定时的设定的( )内的设定值是施行了3线制初始化的值.

★=出厂设定值

参数一览表(继上页)

参数ON	名称 (液晶画面的表示)	设定范围	设定值	参数ON	名称 (液晶画面的表示)	设定范围	设定值
H1-05	端子7功能选择	0~77		L2-01	瞬停动作选择	0~2	
H1-06	端子8功能选择	0~77		L2-02	瞬停补偿时间	0.0~2.0	
H2-01	端子9-10功能选择	0~37		L2-03	基极BB时间	0.1~5.0	
H2-02	端子25功能选择	0~37		L2-04	电压复归时间	0.1~5.0	
H2-03	端子26功能选择	0~37		L2-05	低电压检出值	150~210*2	
H3-01	端子13输入信号	0,1		L2-06	KEB减速频率	0.0~100.0	
H3-02	端子13输入增益	0.0~1000.0		L3-01	加速防止选择	0~2	
H3-03	端子13输入偏置	-100.00~ +100.0		L3-02	加速防止电平	0~200	
H3-04	端子16输入信号	0,1		L3-03	加速防止极限	0~100	
H3-05	端子16功能选择	0~1F		L3-04	减速防止选择	0~3	
H3-06	端子16输入增益	0.0~1000.0		L3-05	运行防止选择	0~2	
H3-07	端子16输入偏置	-100.0~ +100.0		L3-06	运行防止电平	30~200	
H3-08	端子14输入信号	0~2		L4-01	频率检出值	0.0~400.0	
H3-09	端子14功能选择	0~1F		L4-02	频率检出幅	0.0~20.0	
H3-10	端子14输入增益	0.0~1000.0		L4-03	频率检出值	-400.0~+400.0	
H3-11	端子14输入偏置	-100.0~ +100.0		L4-04	频率检出幅(+/-)	0.0~20.0	
H3-12	滤波常数	0.00~2.00		L4-05	指令丧失方式	0,1	
H4-01	端子21监视选择	1~38		L5-01	复位再试次数	0~10	
H4-02	端子21输出增益	0.00~2.50		L5-02	再试接点动作	0,1	
H4-03	端子21输出偏置	-10.0~ +10.0		L6-01	过力矩检出1	0~4	
H4-04	端子23监视选择	1~38		L6-02	力矩检出值1	0~300	
H4-05	端子23输出增益	0.00~2.50		L6-03	检出时间1	0.0~10.0	
H4-06	端子23输出偏置	-10.0~ +10.0		L6-04	过力矩检出2	0~4	
H4-07	输出信号形式	0,1		L6-05	力矩检出值2	0~300	
H5-01	变频器站地址	0~20		L6-06	检出时间2	0.0~10.0	
H5-02	传送速率选择	0~4		L7-01	正转力矩极限	0~300	
H5-03	传送校验	0,1,2		L7-02	反转力矩极限	0~300	
H5-04	传送出错检出	0~3		L7-03	正转再生极限	0~300	
H5-05	超时检出	0,1		L7-04	反转再生极限	0~300	
L1-01	热保护选择	0,1		L8-01	制动电阻保护	0,1	
L1-02	保护检出时间	0.1~5.0		L8-02	OH报警温度	50~110	

*1.出厂设定时的设定的( )内的设定值是施行了3线制初始化的值。
*2.根据软件版本,也有不表示的
*3.设定范围及出厂设定值因变频器容量而不同

★ =出厂设定值

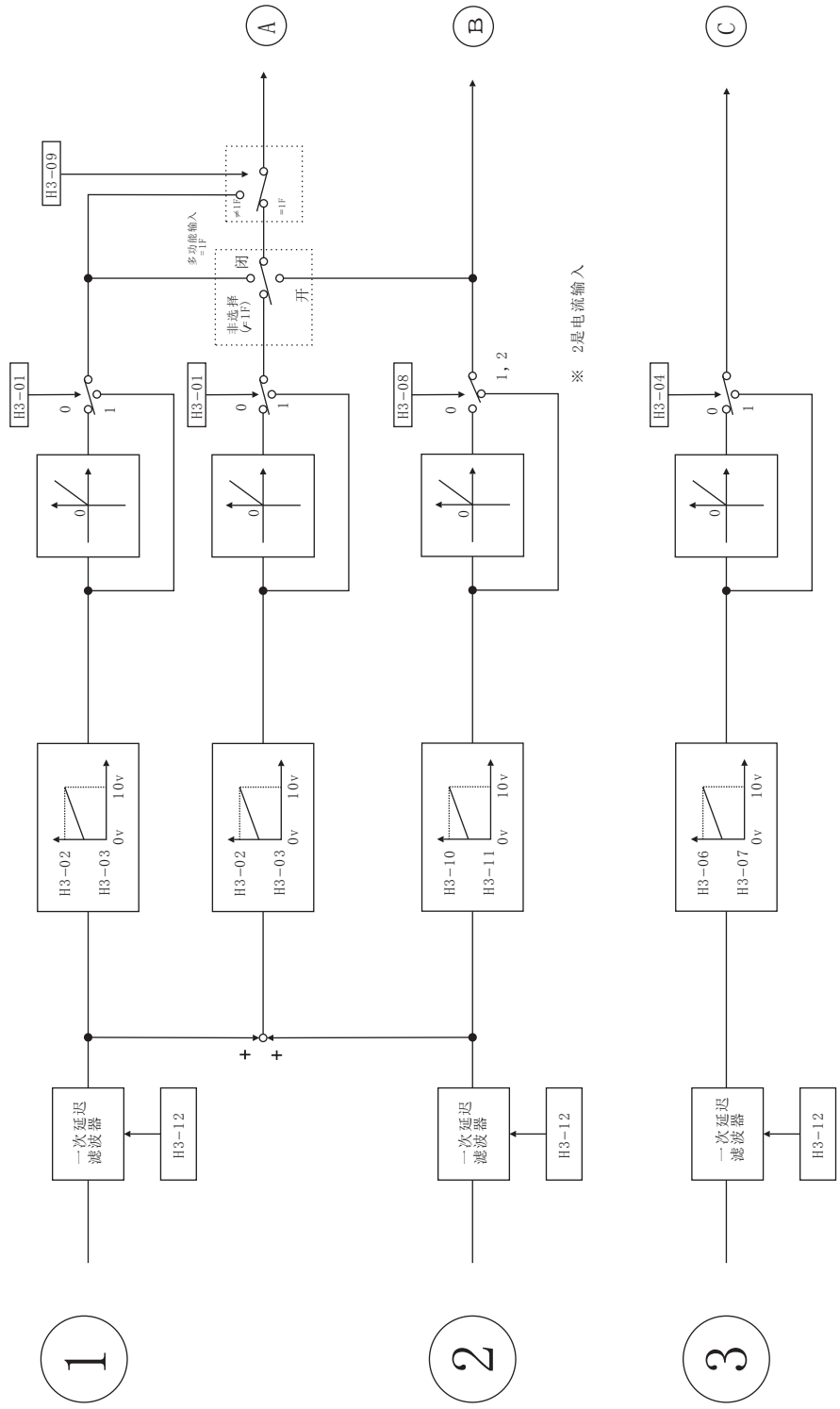
参数一览表(继上页)

参数NO	名称 (液晶画面的表示)	设定范围	设定值	参数NO	名称 (液晶画面的表示)	设定范围	设定值
L8-03	OH报警动作	0~3		o1-05	参数表示方法	0,1	
L8-05	输入缺相保护	0,1		o2-01	L/R选择键	0,1	
L8-07	输出缺相保护	0,1		o2-02	设定STOP键	0,1	
L8-10	接地保护	0,1		o2-03	用户记忆参数	0~2	
L8-17	载波低减选择	0~3		o2-04	容量设置	0~FF*	
L8-19	低速时的OL2特性	0,1		o2-05	频率设定方法 *1	0,1	
o1-01	驱动监视选择	4~38		o2-06	键盘断线选择	0,1	
o1-02	电源投入监视	1~4		o2-07	累计时间初值	0~65535	
o1-03	线速度设定	0~39999		o2-08	累计时间选择	0,1	
o1-04	显示单位	0,1		o2-09	初始模式选择 *1	0~2	

* 1.根据软件版本,也会有不表示的
* 2.设定范围及出厂设定根据变频器功率大小而有所不同

★=出厂设定值

■ A1 详细方框图



★ =出厂设定值

9.5 直流电抗器选型表

变频器型号	功率	输出电流	直流电抗器规格	优利康厂内料号
YD3030 T4 BN	30kw	65A	76A/1.0mH	YDCL003
YD3037 T4 (B)N	37.5kw	80A	94A/0.82mH	YDCL004
YD3045 T4 (B)N	45kw	96A	112A/0.66mH	YDCL005
YD3055 T4 (B)N	55kw	128A	220A/0.29mH	YDCL006
YD3075 T4 (B)N	75kw	165A	290A/0.22mH	YDCL007
YD3093 T4 (B)N	93kw	180A	290A/0.22mH	YDCL007
YD3110 T4 (B)N	110kw	224A	390A/0.16mH	YDCL008
YD3132 T4 (B)N	132kw	260A	390A/0.16mH	YDCL008
YD3160 T4 (B)N	160kw	302A	520A/0.12mH	YDCL009
YD3185 T4 (B)N	185kw	340A	520A/0.12mH	YDCL009
YD3200 T4 (B)N	200kw	380A	650A/0.10mH	YDCL010
YD3220 T4 (B)N	220kw	450A	650A/0.10mH	YDCL010
YD3250 T4 (B)N	250kw	470A	650A/0.10mH	YDCL010
YD3280 T4 (B)N	280kw	530A	800A/0.08mH	YDCL011
YD3315 T4 (B)N	315kw	605A	800A/0.08mH	YDCL011

★ =出厂设定值

9.6 安装尺寸

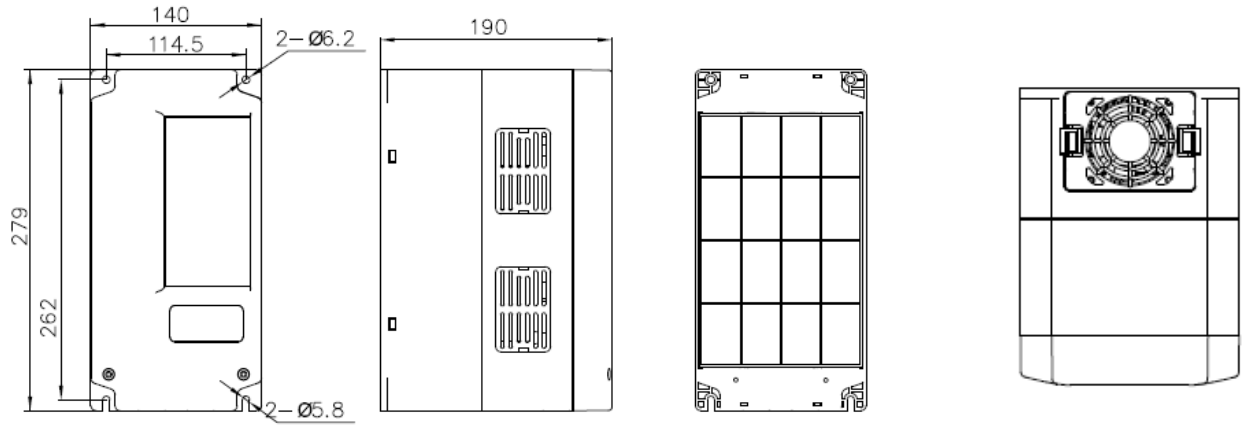


图 1

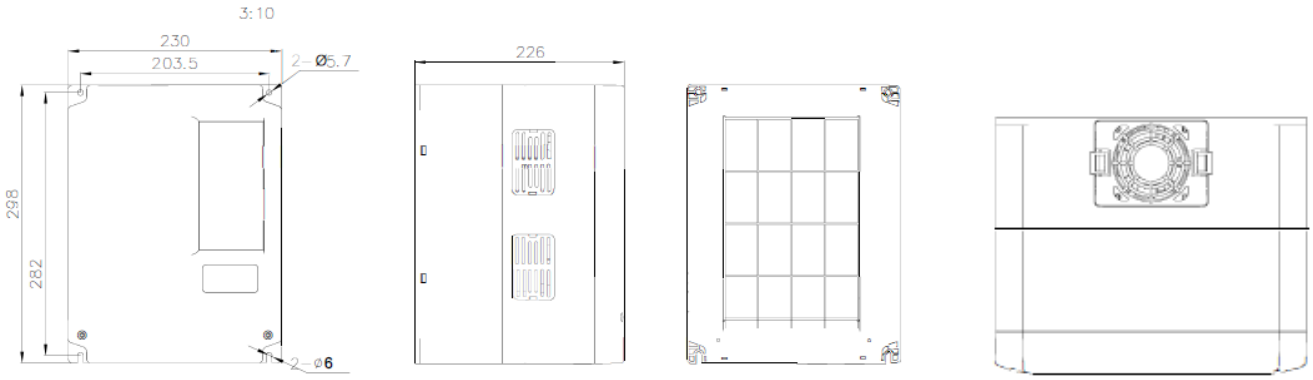


图 2

型号	适配功率	外形尺寸			安装尺寸		图
		H	W	D	H1	W1	
YD31P5T4BN~YD35P5T4BN	1.5-5.5kW	279	140	190	262	114.5	图 1
YD37P5T4BN~YD3022T4BN	7.5-22kW	298	229.5	226	282	203.5	图 2

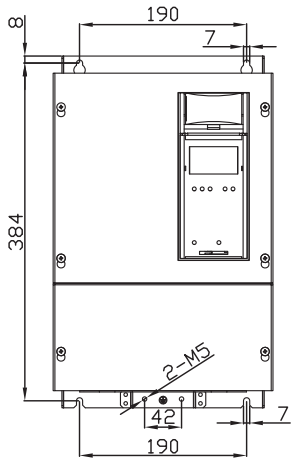
单位：mm

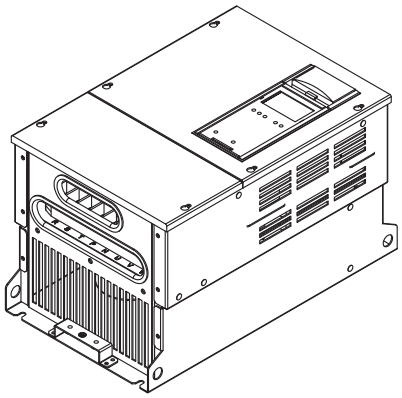
YD31P5 T4 BN
YD32P2 T4 BN
YD33P7 T4 BN
YD35P5 T4 BN
YD37P5 T4 BN
YD3011 T4 BN
YD3015 T4 BN
YD3018P5 T4 BN
YD3022 T4 BN

(塑料外壳)

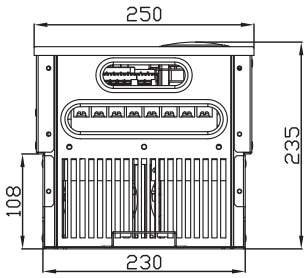
安装尺寸若有变化,恕不另行通知.请咨询当地代理商.

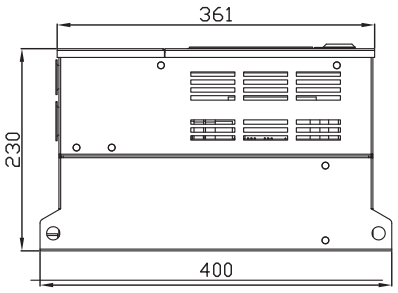
★ =出厂设定值



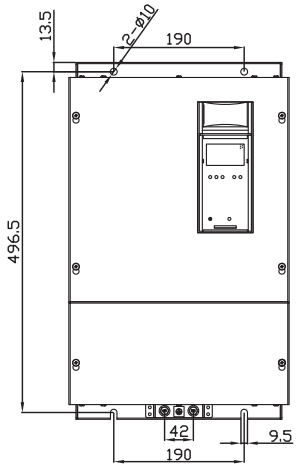


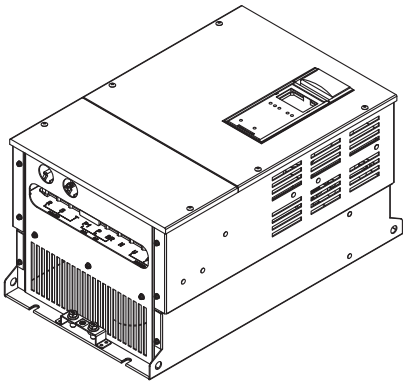
注：金属壳

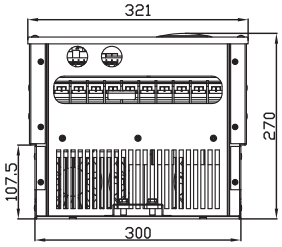


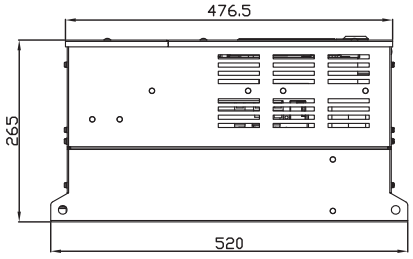


框号4：
YD3030 T4 N





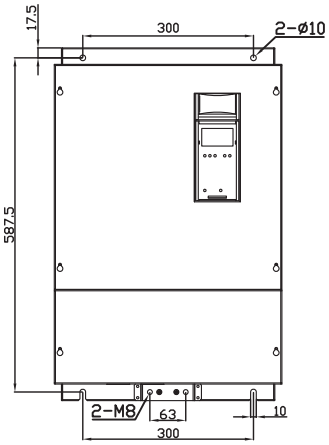


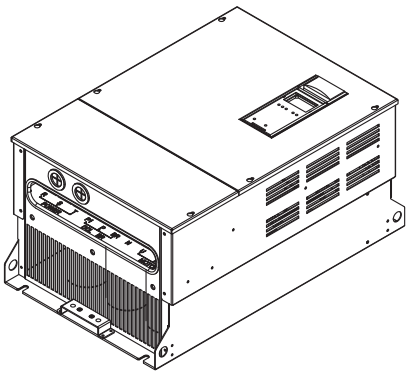


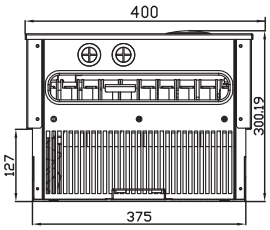
框号5：
YD3030 T4 BN
YD3037 T4 (B)N
YD3045 T4 (B)N
YD3055 T4 (B)N

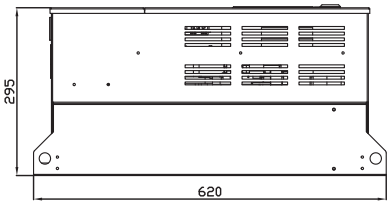
安装尺寸若有变化,恕不另行通知.请咨询当地代理商.

★ =出厂设定值

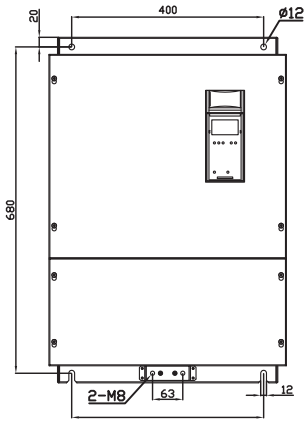


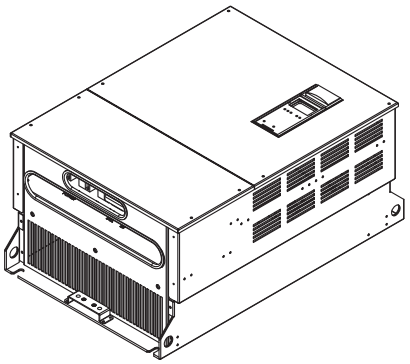


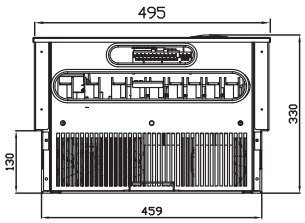


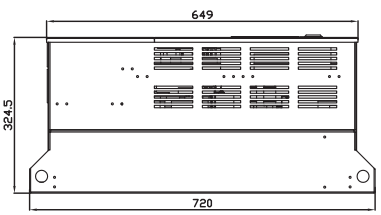


框号6：
YD3075 T4 (B)N
YD3093 T4 (B)N
YD3110 T4 (B)N





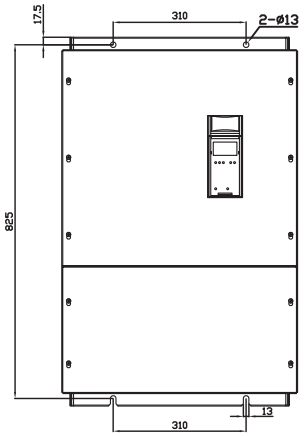


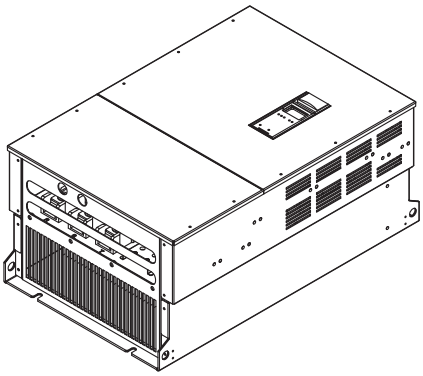


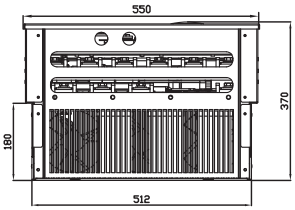
框号7：
YD3132 T4 (B)N
YD3160 T4 (B)N

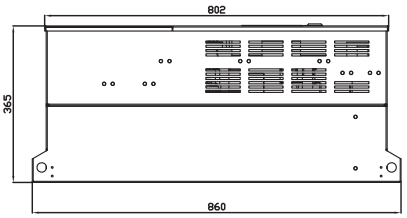
安装尺寸若有变化,恕不另行通知.请咨询当地代理商.

★ =出厂设定值









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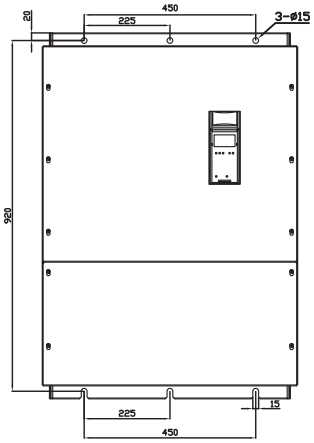
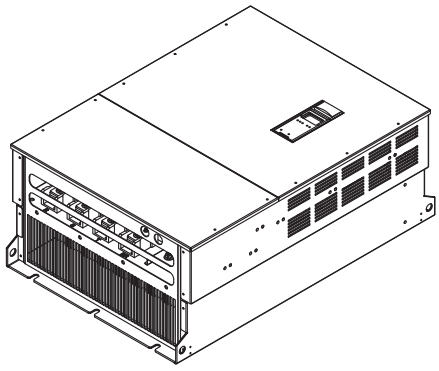
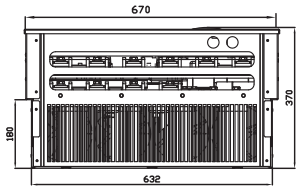
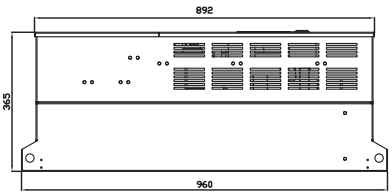
YD3200 T4(B)N
YD3220 T4(B)N
YD3250 T4(B)N









框号9：
YD3280 T4 (B)N
YD3315 T4 (B)N

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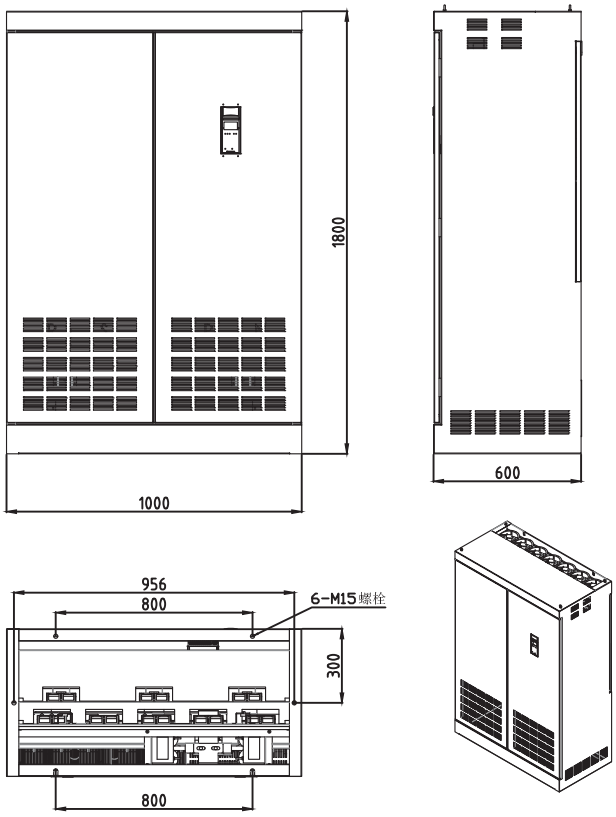
★ =出厂设定值



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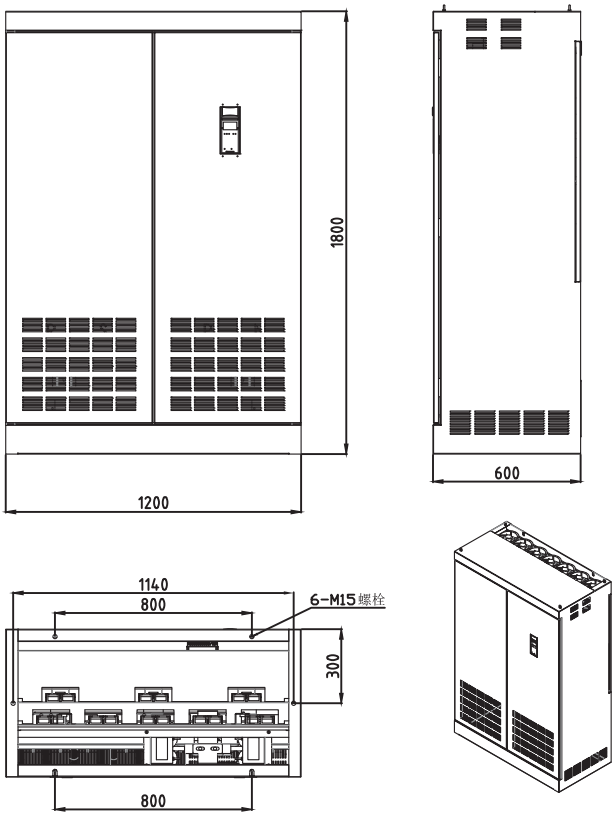
YD3400 T4 N
YD3450 T4 N



框号11：
YD3500 T4 N
YD3560 T4 N
YD3630 T4 N

安装尺寸若有变化,恕不另行通知.请咨询当地代理商.

★ =出厂设定值

记 事

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电话: +86-0510-85161131/85161132
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销 售 服 务 联 络 地 址

Yolico

本产品在改进的同时,资料可能有所变动,恕不另行通知。

2025.07. V03

Yolico

YD3000N
INSTRUCTION MANUAL

MULTI-FUNCTION ALL-DIGITAL TYPE

MODEL: YD3000T4 N

400V CLASS 1.5~630KW

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

Yolico

CAUTION

- May cause injury or electric shock
  Please follow the instructions in the manual before installation or operation.
- Disconnect all power before opening front cover of unit. wait 5 minutes until DC BUS capacitors discharge.
- Use proper grounding techniques.

- Thank you for choosing Electric Co., Ltd. produced by the yolico Yd5000 series of high-performance vector control inverter.
- In order to give full play to the function of the drive to ensure the safety of users, please read the operating instructions, and submitted to end-users of this specification, properly preserved.
- If you have any questions, please even if the agent or the Company to contact officers of our business, we will be happy to serve you.
  Shown in the figure of this manual is to illustrate the example, may get the product will be different.
- Since product improvement, there will be appropriate changes.
- This book shows the power of interpretation and change rests with the Wuxi City yolico Electric Company Limited.

Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions providedin this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ WARNING Indicates precautions that, if not heeded, could possibly result in loss of life orserious injury.

⚠ CAUTION Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

The ISO symbol is used in this manual.
Both of these symbols appearonwarning labelsonYaskawa products. Please abideby these warning labels regardless of which symbol is used.

Safety Precautions

■ Confirmations upon Delivery

⚠ CAUTION

- Never install an Inverter that is damaged or missing components.
  Doing so can result in injury.

■ Installation

⚠ CAUTION

- Always hold the case when carrying the Inverter.
  If the Inverter is held by the front cover, the main body of the Invertermayfall, possibly resulting in injury.
- Attach the Inverter to a metal or other noncombustible material.
  Fire can result if the Inverter is attached to a combustible material.
- Install a cooling fan or other cooling device when installing more than one Inverter in the same enclosure so that the temperature of the air entering the Inverters is below 45_C.
  Overheating can result in fires or other accidents.

■ Wiring

⚠ WARNING

- Always turn OFF the input power supply before wiring terminals.
  Otherwise, an electric shock or fire can occur.
- Wiring must be performed by an authorized person qualified in electrical work.
  Otherwise, an electric shock or fire can occur.
- Be sure to ground the ground terminal.
  (400 V class: Ground to 10 Ω or less)
  Otherwise, an electric shock or fire can occur.
- Always check the operation of any emergency stop circuits after they are wired.
  Otherwise, there is the possibility of injury. (Wiring is the responsibility of the user.)
- Never touch the output terminals directly with your hands or allow the output lines to come into contact with the Inverter case. Never short the output circuits.
  Otherwise, electrical shock or grounding can occur.

⚠ CAUTION

- Check to be sure that the voltage of the main AC power supply satisfies the rated voltage of the Inverter.
  Injury or fire can occur if the voltage is not correct.
- Do not perform voltage withstand tests on the Inverter.
  Otherwise, semiconductor elements and other devices can be damaged.
- Connect braking resistors, Braking Resistor Units, and Braking Units as shown in the I/O wiring examples.
  Otherwise, a fire can occur.
- Tighten all terminal screws to the specified tightening torque.
  Otherwise, a fire may occur.
- Do not connect AC power to output terminals U, V, and W.
  The interior parts of the Inverter will be damaged if voltage is applied to the output terminals.
- Do not connect phase-advancing capacitors or LC/RC noise filters to the output circuits.
  The Inverter can be damaged or internal parts burnt if these devices are connected.
- Do not connect electromagnetic switches or contactors to the output circuits.
  If a load is connected while the Inverter is operating, surge current will cause the overcurrent protection circuit inside the Inverter to operate.

■ **Setting User Constants**

⚠ CAUTION

- Disconnect the load (machine, device) from the motor before autotuning.
  The motor may turn, possibly resulting in injury or damage to equipment. Also, motor constants cannot be correctly set with the motor attached to a load.

■ **Trial Operation**

⚠ WARNING

- Check to be sure that the front cover is attached before turningONthe power supply. Do not remove the front cover during operation.
  An electric shock may occur.
- Donot come close to the machine when the fault reset function is used. If the alarmed is cleared, the machine may start moving suddenly.
  Also, design the machine so that human safety is ensured even when it is restarted.
  Injury may occur.
- Provide a separate emergency stop switch; the Digital Operator STOP Key is valid only when its function is set.
  Injury may occur.
- Reset alarms only after confirming that theRUNsignal isOFF. If an alarm is reset with the RUN signal turned ON, the machine may suddenly start.
  Injury may occur.

⚠ CAUTION

- Don't touch the radiation fins (heat sink), braking resistor, or Braking Resistor Unit. These can become very hot.
  Otherwise, a burn injury may occur.
- Be sure that the motor and machine is within the applicable ranges before starting operation.
  Otherwise, an injury may occur.
- Provide a separate holding brake if necessary.
  Otherwise, an injury may occur.
- Don't check signals while the Inverter is running.
  Otherwise, the equipment may be damaged.
- Be careful when changing Inverter settings. The Inverter is factory set to suitable settings.
  Otherwise, the equipment may be damaged.You must, however, you must set the power supply voltage jumper for 400 V class Inverters of 18.5 kW or higher (see 5.2.4).

■ Maintenance and Inspection

⚠ WARNING

- Do not touch the Inverter terminals. Some of the terminals carry high voltages and are extremely dangerous.
  Doing so can result in electric shock.
- Always have the protective cover in place when power is being supplied to the Inverter. When attaching the cover, always turn OFF power to the Inverter through the MCCB.
  Doing so can result in electric shock.
- After turningOFFthe main circuit power supply, wait until theCHARGEindicator light goes out before performance maintenance or inspections.
  The capacitor will remain charged and is dangerous.
- Maintenance, inspection, and replacement of parts must be performed only by authorized personnel.
  Remove all metal objects, such as watches and rings, before starting work. Always use grounded tools.
  Failure to heed these warning can result in electric shock.

⚠ WARNING

- ACMOSIC is used in the control board. Handle the control board andCMOSIC carefully. The CMOS IC can be destroyed by static electricity if touched directly.
  The CMOS IC can be destroyed by static electricity if touched directly.
- Do not change the wiring, or remove connectors or the Digital Operator, during operation.
  Doing so can result in personal injury.

■ Other

⚠ WARNING

- Do not attempt to modify or alter the Inverter.
  Doing so can result in electrical shock or injury.

Table of Contents

1 Introduction

1.1 Outline and Functions

1.1.1 YD3000T4N Inverter Model

YD3000 Inverters are available in 400 V class models. These are listed in the following Table YD3000N Inverter Model

Voltage Class	Click the Power	Input power	Model
			Mode
400V级	1.5	3.7	YD31P5-T4N
	2.2	4.7	YD32P2-T4N
	3.7	6.1	YD33P7-T4N
	5.5	11	YD35P5-T4N
	7.5	14	YD37P5-T4N
	11	21	YD3011-T4N
	15	26	YD3015-T4N
	18.5	31	YD3018-T4N
	22	37	YD3022-T4N
	30	50	YD3030-T4(B)N
	37	61	YD3037-T4(B)N
	45	73	YD3045-T4(B)N
	55	98	YD3055-T4(B)N
	75	130	YD3075-T4(B)N
	93	150	YD3093-T4(B)N
	110	170	YD3110-T4(B)N
	132	210	YD3132-T4(B)N
	160	230	YD3160-T4(B)N
	185	260	YD3185-T4(B)N
	200	300	YD3200-T4(B)N
	220	340	YD3220-T4(B)N
	250	380	YD3250-T4(B)N
	280	430	YD3280-T4(B)N
	315	460	YD3315-T4(B)N
	355	490	YD3355-T4N
	400	519	YD3400-T4N
	450	585	YD3450-T4N
	500	650	YD3500-T4N
	560	720	YD3560-T4N
	630	780	YD3630-T4N

1.1.2 Outline of Control Methods

The YD3000N uses four control methods.

- Open-loop vector control (factory setting)
- Flux vector control
- V/f control without PG
- V/f control with PG feedback

PG stands for pulse generator (encoder).

Vector control is a method for removing interference with magnetic flux and torque, and controlling torque according to references.

Current vector control independently controls magnetic flux current and torque current by simultaneously controlling the motor primary current and phases. This ensures smooth rotation, high torque, and accurate speed/torque control at low speeds.

Vector control can be replaced by the conventional V/f control system. If the motor constants required forvector control are not known, the motor constants can be automatically set with autotuning.

The control methods are effective for the following applications:

- Open-loop vector control: General variable-speed drive.
- Flux vector control: Simple servodrive, high-precision speed control/torque control.
- V/f control without PG: Conventional Inverter control mode. Used for multi-drive operation (connecting multiple motors to one Inverter).
- V/f control with PG feedback: Simple speed feedback control. (For applications with the PG connected to the machine shaft rather than the motor shaft.)

The control characteristics for each mode are shown in Table 1.2.

Table 1.2 Control Method Characteristics

	Vector Control		V/f Control	
	Open-loop	Flux Vector	Without PG	With PG feedback
Speed Control Range	1:100	1:100	1:40	1:40
Speed Control Precision	±0.2%	±0.02%	±2~3%	±0.03%
Initial Drive	150% at 1 Hz	150% at 0 r/min	150% at 3 Hz	

1.1.3 Functions

■ Autotuning

Autotuning is effective for vector control. It solves problems in applicable motor restrictions an Difficultconstant settings. The motor constants are automatically set by entering a value from the motor's rating nameplate.

Autotuning allows flux vector control to operate accurately with virtually any normalACinduction motor,regardless of the supplier.

Always autotune the motor separately before operating using vector control. Refer to 5.2.5 Autotuning and6.4.3 Autotuning for details.

■ Torque Control

Torque control is effective for flux vector control with PG. Torque is controlled by taking multi-function analog input signals as torque references. Torque control accuracy is ±5%. Switching is possible between torque control and speed control.

■ V/f Pattern Settings

V/f pattern settings are effective for V/f control. Select a V/f pattern according to the application from among the 15 preset V/f patterns. Custom V/f patterns can also be set.

■ Frequency References

The following five types of frequency references can be used to control the output frequency of the Inverter.

- Numeric input from the Digital Operator
- Voltage input within a range from 0 to 10 V
- Voltage input within a range from 0 to ±10 V (with negative voltages, rotation is in the opposite direction from the run command.)

- Current input within a range from 4 to 20 mA
- Input from Option Card

Any of the above frequency references can be used by setting a constant.

Amaximum of nine frequency references can be registered with the Inverter.With remote multi-step speed reference inputs, the Inverter can operate in multi-step speed operation with a maximum of nine speed steps.

PID Control

The Inverter has a PID control function for easy follow-up control. Follow-up control is a control method in which the Inverter varies the output frequency to match the feedback value from the sensor for a set target value.

Follow-up control can be applied to a variety of control operations, such as those listed below, depending on the contents detected by the sensor.

- Speed Control: With a speed sensor, such as a tacho-generator, the Inverter regulates the rotat ingspeed of the motor regardless of the load of the motor or synchronizes the rotating speed of the motor with that of another motor.
- Pressure Control: With a pressure sensor, the Inverter performs constant pressure control.
- Flow-rate Control: By sensing the flow rate of a fluid, the Inverter performs precise flow-rate control.
- Temperature Control: With a temperature sensor, the Inverter performs temperature control by fan speed.

Zero-servo Control

Zero-servo control is effective with flux vector control. Even at a motor speed of zero (r/min), a torque of 150% of the motor's rated torque can be generated and the average servomotor holding power (stopping power) can be obtained.

Speed Control By Feedback

Speed control using feedback is effective with a PG. An optional PG Speed Control Card be used to enable feedback control for speeds, thereby improving speed control accuracy.

Dwell Function

By holding the output frequency for a constant time during acceleration and deceleration, acceleration and deceleration can be performed without stepping out even when driving a motor with a large startup load.

Low Noise

The output transistor of the Inverter is an IGBT (insulated gate bipolar transistor). Using sine-wave PWM with a high-frequency carrier, the motor does not generate metallic noise.

Monitor Function

The following items can be monitored with the Digital Operator: Frequency reference, output frequency, output current, motor speed, output voltage reference, main-circuit DC voltage, output power, torque reference,status of input terminals, status of output terminals, operating status, total operating time, softwarenumber, speed deviation value, PID feedback value, fault status, fault history, etc.

All types of data can be monitored even with multi-function analog output.

Multilingual Digital Operator (SPEC:F)

The Digital Operator can display in seven languages (Japanese, English, German, French, Italian, Spanish,and Portuguese). The Digital Operator's liquid crystal display provides a 16-character x 2-line display area.

Easy-to-read displays in each language allow the advanced functions of the Inverter to be set in interactiveoperations to input constants, monitoring items, etc. Change the constant setting to select the display language.

■ User Constant Structure and Three Access Levels

The YD3000N has a number of user constants for setting various functions. These user constants are classified into a hierarchy to make them easier to use.

The levels are as follows from top to bottom: Modes, Groups, Functions, and Constants. The access levelsfor the user constants are shown in Table 1.3.

Table 1.3 Access Levels for User Constants

Level	Contents
Mode	Classified according to operation Operation: For operating the Inverter. (All kinds of monitoring are possible.) Initialize: For selecting the language displayed at the Digital Operator, setting access levels, initialization, and the control modes. Programming: For setting user constants for operation. Autotuning: For automatic calculation or setting motor constants. (Only under the vector control mode.) Modified constants: For referencing or changing user constants after shipping.
Groups	Classified by application.
Functions	Classified by function. (See user constants.)
Constants	Individual user constant settings.

The YD3000N allows the following three access levels to be set in order to further simplify setting user constants. (An access level is a range of user constants that can be referenced or set.)

Quick-Start	Reads/sets user constants required for trial operation. [Factory setting]
Basic	Reads/sets user constants that are commonly used.
Advanced	Reads/sets all the user constants that can be used.

In general, press the DATA / ENTER Key to move from an upper to a lower level. This varies somewhat, however, according to the access level, as shown in Fig. 1.1. For the Quick-Start access level, which has few user constants that can be set, pressing the DATA/ENTER Key jumps directly to the user constant level;whereas for the Advanced access level, which has many user constants, pressing the DATA / ENTERKey first leads to the Group level.

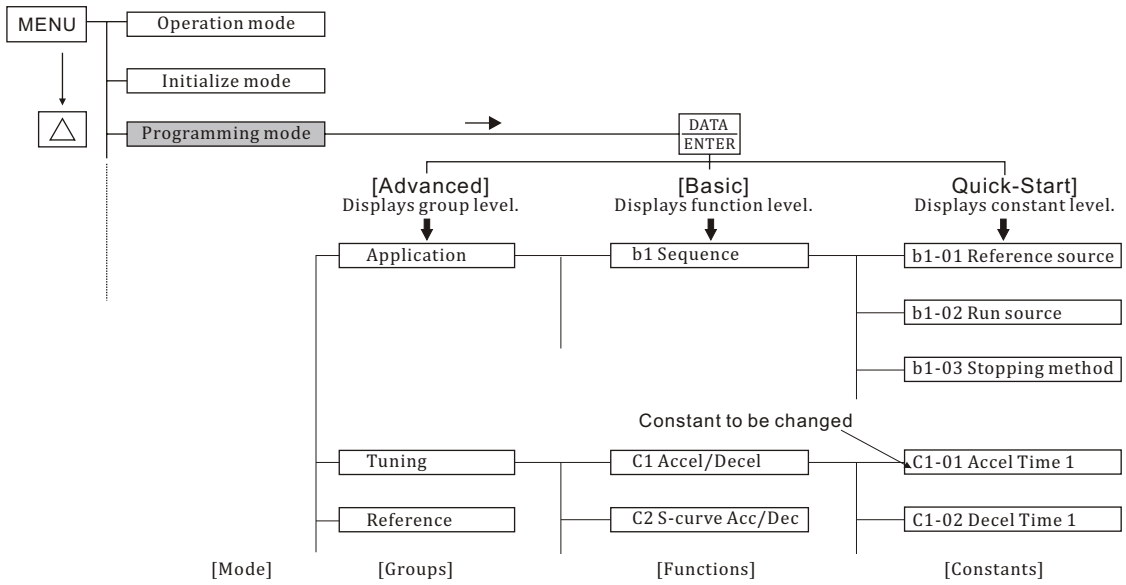
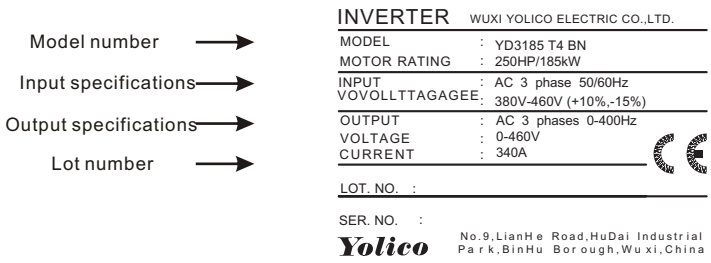


Fig 1.1 Access Level Structure

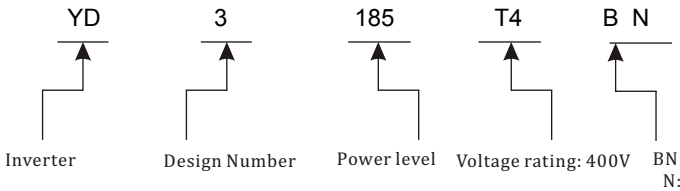
2 Handling Inverters

2.1 Example Nameplate

Standard domestic Inverter: 3-phase, 400 VAC, 185kW, IEC IP20 and NEMA 1 standards



2. 2Model Description



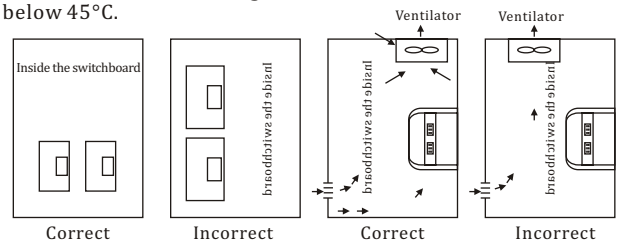
2. 3 Installation Site

Install the Inverter under the following conditions.

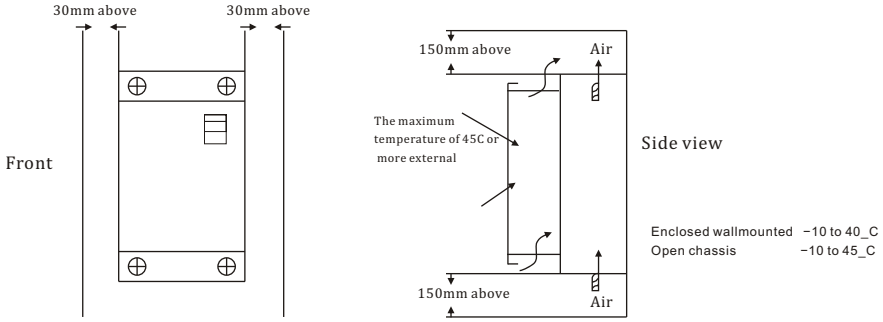
Type	Ambient Operating Temperature
Enclosed wallmounted	−10 to 40_C
Open chassis	−10 to 45_C

Protection covers are attached to the top and bottom of the Inverter.Be sure to remove the protection covers before installing a 200 or 400 V Class Inverter with an output of 15 kW or less in a panel.D Install the Inverter in a clean location free from oil mist and dust. It can be installed in a totally enclosed panel that is completely shielded from floating dust.
When installing or operating the Inverter, always take special care so that metal powder, oil, water, orother foreign matter does not get into the Inverter.
Do not install the Inverter on combustible material, such as wood.
Install the Inverter in a location free from radioactive materials and combustible materials.
Install the Inverter in a location free from harmful gasses and liquids.
Install the Inverter in a location without excessive oscillation.
Install the Inverter in a location free from chlorides.
Install the Inverter in a location not in direct sunlight.

- To enhance the reliability of operation, the Inverter should be installed in an environment free from extremetemperature increases. If the Inverter is installed in an enclosed environment, such as a box, use acooling fan or air conditioner to maintain the internal air temperature below 45°C.



- cover over the Inverter during installation to shield it from metal power produced by drilling.
- Always remove the cover from the Inverter after completing installation. Otherwise, ventilation will bereduced, causing the Inverter to overheat.



3 Wiring

3.1 Connection Diagram

The connection diagram of the YD5000 is shown in Figure 3.2.

When using the Digital Operator, the motor can be operated by wiring only the main circuits.

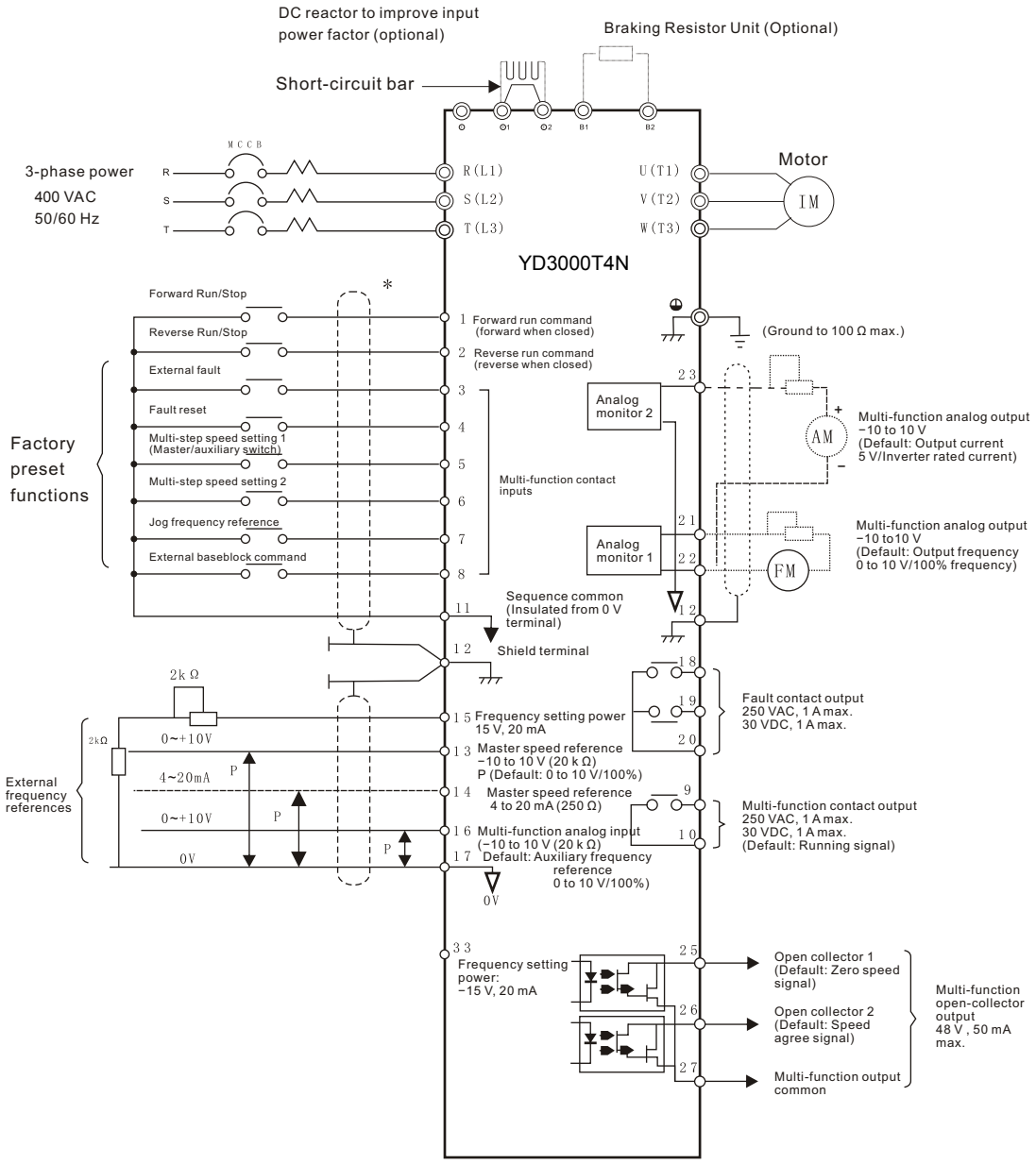


Fig 3.2 Connection Diagram (Model YD3 07P5T4N Shown Above)

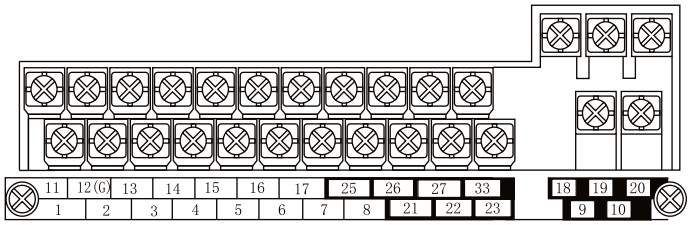
IMPORTANT

1. Control circuit terminals 1 to 33 are not arranged in order of terminal numbers; they are arranged as shown below. Be sure to wire them correctly.

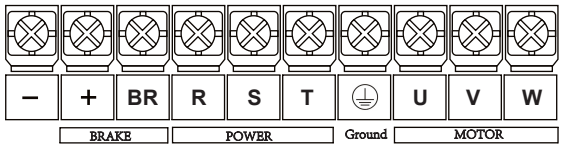
11	12(G)	13	14	15	16	17	25	26	27	33	18	19	20
1	2	3	4	5	6	7	8	21	22	23	9	10	

2. Do not use control circuit terminals 13 and 14 at the same time.
(The two signals will be added inside the Inverter if they are input at the same time.)
3. The maximum output current capacity of the +15 V/−15 V output from control circuit terminals 15 and 33 is 20 mA.
4. The multi-function analog output is a dedicated meter output for a frequency meter, ammeter, etc. Do not use this output for feedback control or for any other control purpose.
Use one of the optional Analog Monitor Cards (AO-08 or AO-012) for analog outputs to the control system.
5. Disable the stall prevention during deceleration (set constant L3-04 to 0) when using a Braking Resistor Unit. If this user constant is not changed to disable stall prevention, the system may not stop during deceleration.
6. Enable protection for the internal DB resistor (model ERF) (set constant L8-01 to 1) when using an internal braking resistor. The braking resistor will not be protected unless this setting is changed to enable protection.
7. DC reactors to improve the input power factor can be connected as an option only to Inverters for 15 kW or less. Remove the short bar from between ¨1 and ¨2 when connecting a DC reactor.
8. There is no DC power supply input terminals for 200 V class Inverters of 30 to 75 kW and 400 V class Inverters of 55 to 160 kW, and DC power cannot be input to these Inverters.

3.2 Terminal Block Configuration

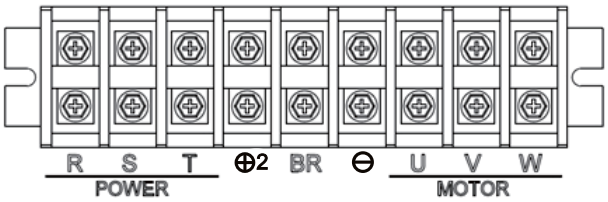


Control circuit terminal

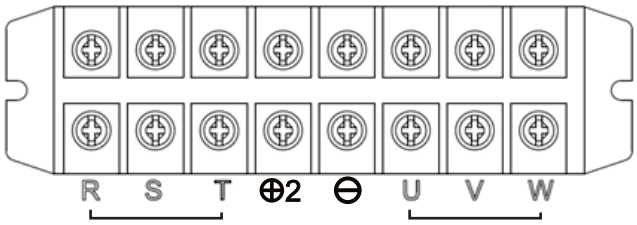


YD31P5 T4 BN
YD32P2 T4 BN
YD33P7 T4 BN
YD35P5 T4 BN
YD37P5 T4 BN
YD3011 T4 BN
YD3015 T4 BN
YD3018P5 T4 BN
YD3022 T4 BN

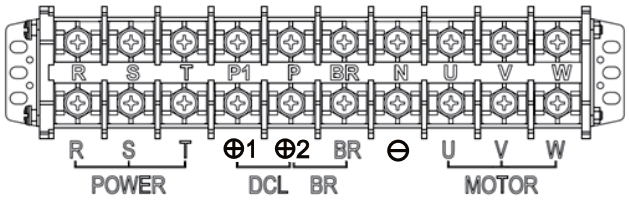
(plastics case)



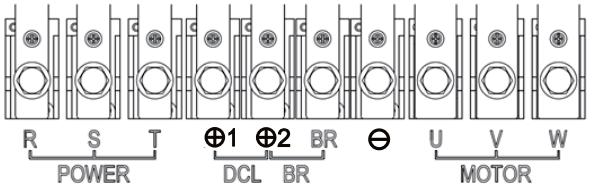
F4:YD3018 T4 BN
YD3022 T4 BN
(metal case) *old type



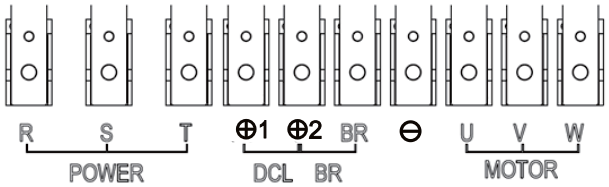
F4:YD3030 T4 N



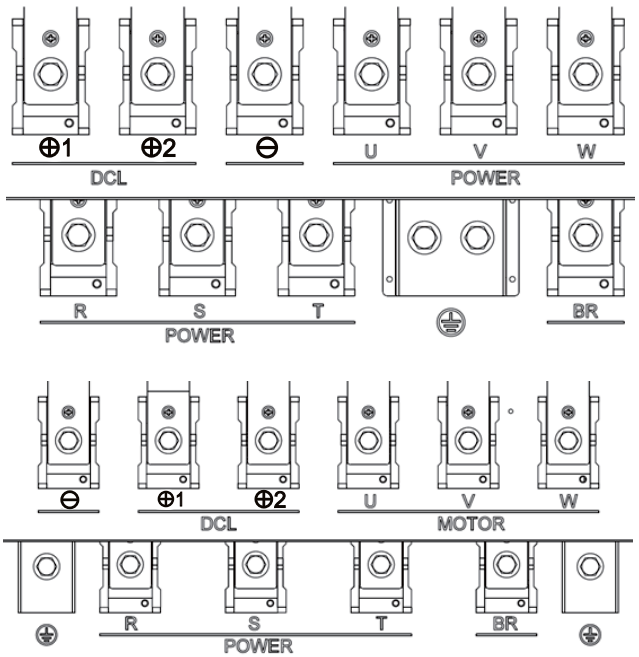
F5:YD3030 T4 BN
YD3045 T4 BN
YD3055 T4 BN



F6:YD3075 T4 BN
YD3093 T4 BN
YD3110 T4 BN



F7:YD3132 T4 BN
YD3160 T4 BN



F8:YD3185 T4 BN
YD3200 T4 BN
YD3220 T4 BN
YD3250 T4 BN

F9:YD3280 T4 BN
YD3315 T4 BN

*R/S/T: Input Power *DCL: DC reactor (When not in use Short circuit chip connection)
*U/V/W: Output (motor) *BR: braking resistor,The other end of the connection"P"

Because of design changes ,There may be differences between the above terminal wiring and physical object
According to the real object

3.3 Wiring the Main Circuits

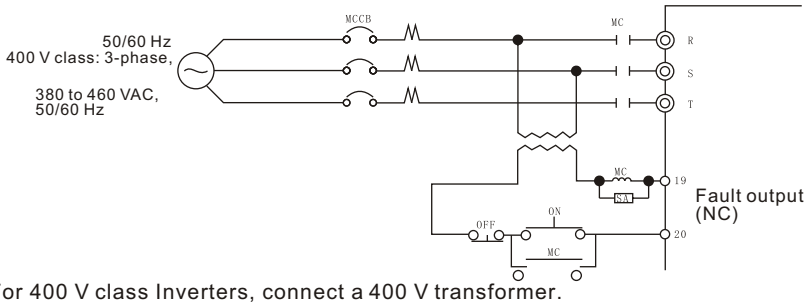
This section describes wiring connections for the main circuit inputs and outputs.

■ Wiring Main Circuit Inputs

Installing a Molded-case Circuit Breaker

Always connect the power input terminals (R, S, and T) and power supply via a molded-case circuit breaker(MCCB) suitable for the Inverter.

- Choose an MCCB with a capacity of 1.5 to 2 times the Inverter's rated current.
- For the MCCB's time characteristics, be sure to consider the Inverter's overload protection (one minute at 150% of the rated output current).
- If the same MCCB is to be used for more than one Inverter, or other devices, set up a sequence so that the power supply will be turned OFF by a fault output, as shown in Figure 3.7.



※ For 400 V class Inverters, connect a 400 V transformer.

Installing a Ground Fault Interrupter

Inverter outputs use high-speed switching, so high-frequency leakage current is generated. Therefore, atthe Inverter primary side, use a ground fault interrupter that detects only the leakage current in the frequencyrange that is hazardous to humans and excludes high-frequency leakage current.

- For the special-purpose ground fault interrupter for Inverters, choose a ground fault interrupter with
- a sensitivity amperage of at least 30 mA per Inverter.

When using a general ground fault interrupter, choose a ground fault interrupter with a sensitivity amperage of 200 mA or more per Inverter and with an operating time of 0.1 s or more.

Installing a Magnetic Contactor

If the power supply for the main circuit is to be shut off during a sequence, a magnetic contactor can beused instead of a molded-case circuit breaker.

When a magnetic contactor is installed on the primary side of the main circuit to forcibly stop the Inverter,however, the regenerative braking does not work and the Inverter will coast to a stop.

- The Inverter can be started and stopped by opening and closing the magnetic contactor on the primary side. Frequently opening and closing the magnetic contactor, however, may cause the Inverter to break down.
- When the Inverter is operated with the Digital Operator, automatic operation cannot be performed after recovery from a power interruption.

Connecting Input Power Supply to the Terminal Block

Input power supply can be connected to any terminal R, S or T on the terminal block; the phase sequence of input power supply is irrelevant to the phase sequence.

Installing an AC Reactor

If the Inverter is connected to a large-capacity power transformer (600kWor more) or the phase advancing capacitor is switched, an excessive peak current may flow through the input power circuit, causing the con verterunit to break down.

To prevent this, install an optional AC Reactor on the input side of the Inverter or a DC reactor to the Dcreactor connection terminals.

This also improves the power factor on the power supply side.

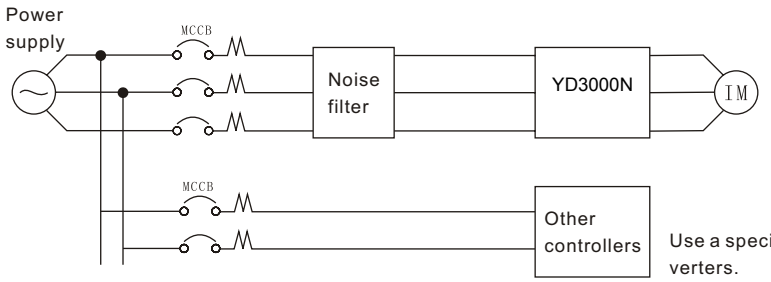
Installing a Surge Absorber

Always use a surge absorber or diode for inductive loads near the Inverter. These inductive loads include magnetic contactors, electromagnetic relays, solenoid valves, solenoids, and magnetic brakes.

Installing a Noise Filter on Power Supply Side

Install a noise filter to eliminate noise transmitted between the power line and the Inverter.

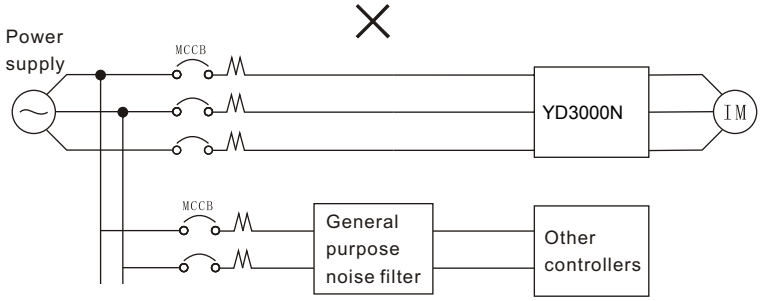
- Wiring Example 1

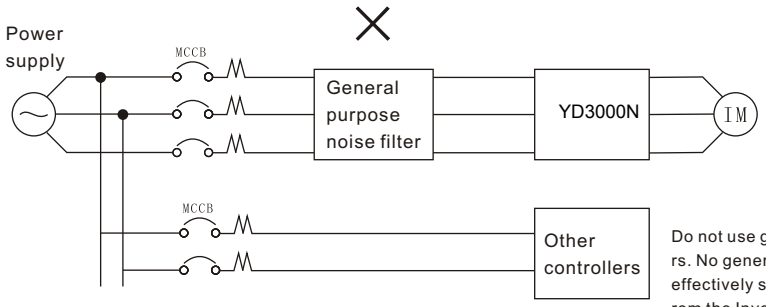


Use a special-purpose noise filter for In verters.

Correct Power supply Noise Filter Installation

- Wiring Example 2





Do not use general-purpose noise filte rs. No generalpurpose noise filter can effectively suppressnoise generated f rom the Inverter.

Incorrect Power supply Noise Filter Installation

■ Wiring on the Output Side of Main Circuit

Connecting the Inverter and Motor

Connect output terminals U, V, and W to motor lead wires U, V, and W, respectively.
Check that the motor rotates forward with the forward run command. Switch over any two of the outputterminals to each other and reconnect if the motor rotates in reverse with the forward run command.

Never Connect a Power Supply to Output Terminals

Never connect a power supply to output terminalsU,V, andW. If voltage is applied to the output terminals,the internal circuits of the Inverter will be damaged.

Never Short or Ground Output Terminals

If the output terminals are touched with bare hands or the output wires come into contact with the Invertercasing, an electric shock or grounding will occur. This is extremely hazardous. Do not short the output wires.

Do Not Use a Phase Advancing Capacitor or Noise Filter

Never to connect a phase advancing capacitor or LC/RC noise filter to an output circuit. Doing so may result in damage to the Inverter or cause other parts to burn.

Do Not Use an Electromagnetic Switch or Magnetic Contactor

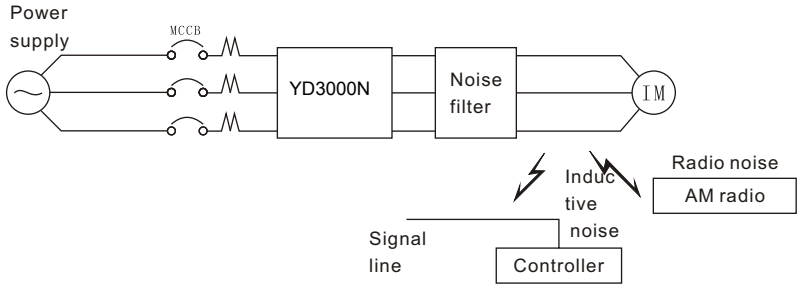
Do not connect an electromagnetic switch or magnetic contactor to an output circuit. If a load is connectedto the Inverter during operation, a surge current will actuate the overcurrent protective circuit in the Inverter.

Installing a Thermal Overload Relay

This Inverter has an electronic thermal protection function to protect the motor from overheating. If, however, more than one motor is operated with one Inverter or a multi-polar motor is used, always install a thermal relay (THR) between the Inverter and the motor and set L1-01 to 0 (no motor protection).Set the thermal overload relay to the value on the motor nameplate when operating at 50 Hz and to 1.1 times the value on the nameplate when operating at 60 Hz. The sequence should be designed so that the contactsof the thermal overload relay turn OFF the magnetic contactor on the main circuit inputs.

Installing a Noise Filter on Output Side

Connect a noise filter to the output side of the Inverter to reduce radio noise and inductive noise.



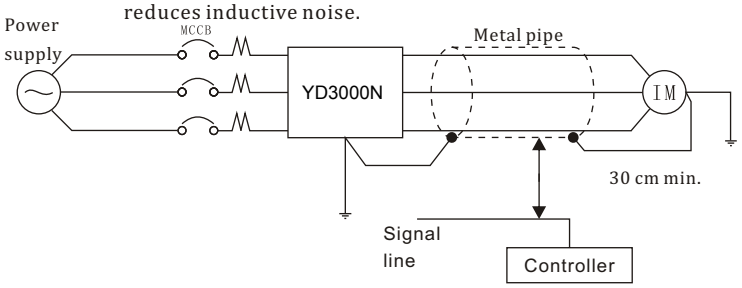
Installing a Noise Filter on the Output Side

Inductive Noise: Electromagnetic induction generates noise on the signal line, causing the controller to malfunction.

Radio Noise: Electromagnetic waves from the Inverter and cables cause the broadcasting radio receiver to make noise.

Countermeasures Against Inductive Noise

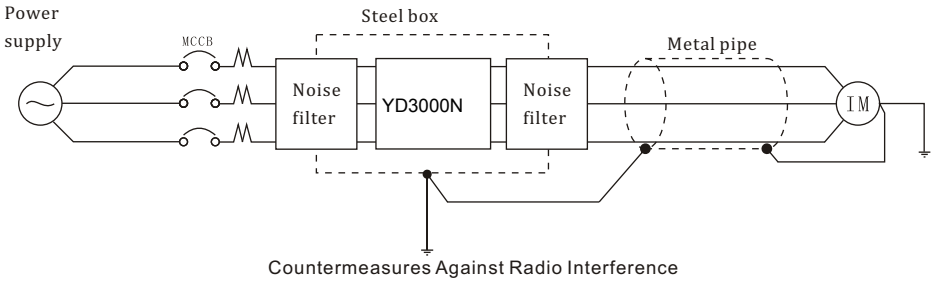
As described previously, a noise filter can be used to prevent inductive noise from being generated on theoutput side. Alternatively, cables can be routed through a grounded metal pipe to prevent inductive noise.Keeping the metal pipe at least 30 cm away from the signal line considerably reduces inductive noise.



Countermeasures Against Inductive Noise

Countermeasures Against Radio Interference

Radio noise is generated from the Inverter as well as from the input and output lines. To reduce radio noise, install noise filters on both input and output sides, and also install the Inverter in a totally enclosed steel box.



Countermeasures Against Radio Interference

Cable Length between Inverter and Motor

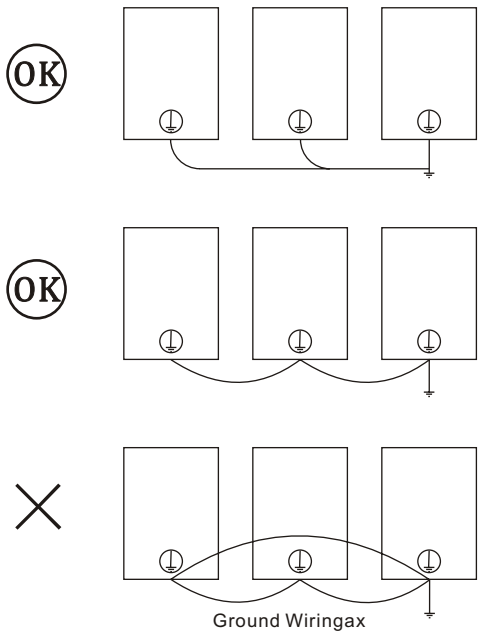
Radio noise is generated from the Inverter as well as from the input and output lines. To reduce radio noise,install noise filters on both input and output sides, and also install the Inverter in a totally enclosed steel box.

The cable between the Inverter and the motor should be as short as possible.

Cable length	50 m max.	100 m max.	More than 100 m
Carrier frequency	15 kHz max.	10 kHz max.	5 kHz max.
(Set value: C6-01)	(15.0)	(10.0)	(5.0)
(Set value: C6-02)	(15.0)	(10.0)	(5.0)
(Set value: C6-03)	(0)	(0)	(0)

■ Ground Wiring

- Always use the ground terminal of the 200 V Inverter with a ground resistance of less than 100 Ω and that of the 400 V Inverter with a ground resistance of less than 10 Ω.
- Do not share the ground wire with other devices, such as welding machines or power tools.
- Always use a ground wire that complies with technical standards on electrical equipment and minimize the length of the ground wire.
- Leakage current flows through the Inverter. Therefore, if the distance between the ground electrode and the ground terminal is too long, potential on the ground terminal of the Inverter will become unstable.When using more than one Inverter, be careful not to loop the ground wire.

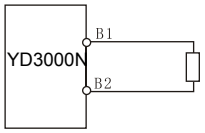


Ground Wiringax

■ Connecting the Braking Resistor (ERF)

Connect the Braking Resistor Unit and Braking Unit to the Inverter as shown in the Figure 3.15.

L8-01 (Overheat protection of brakingresistor)	″1″	(Disables overheat protection)
L3-04 (Stall prevention during deceleration) (Select either one of them.)	″0″	(Disables stall prevention function)
	″3″	(Enables stall prevention function with brakingresistor)



Braking resistor

Connecting the Braking Resistor

The braking resistor connection terminals are B1 and B2. Do not connect to any other terminals. Connecting to any terminals other than B1 or B2 can cause the resistor to overheat, resulting in damage to the equipment.

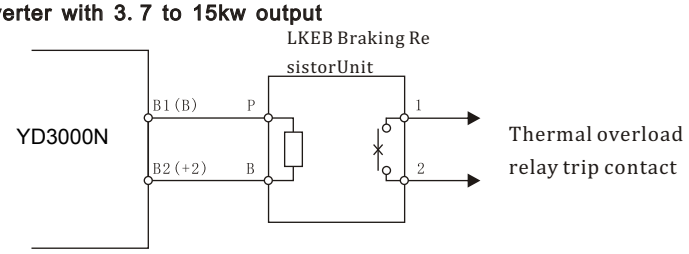
■ Connecting the Braking Resistor Unit (LKEB) and Braking Unit (CDBR)

Connect the Braking Resistor Unit and Braking Unit to the Inverter as shown in the Figure 3.15.

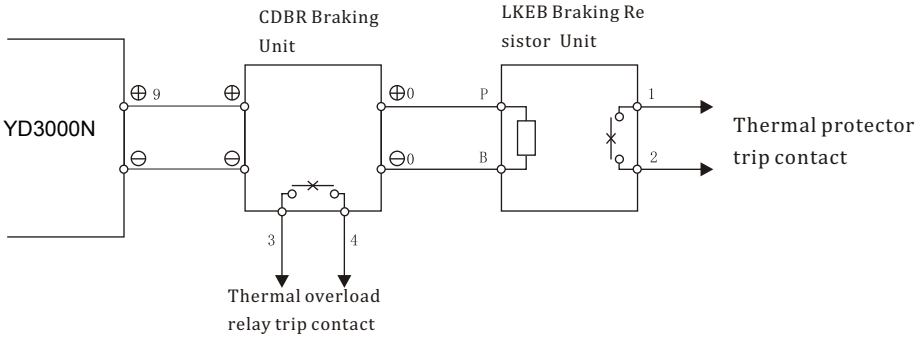
L8-01 (Overheat protection of brakingresistor)	″0″	(Disables overheat protection)
L3-04 (Stall prevention during deceleration) (Select either one of them.)	″0″	(Disables stall prevention function)
	″3″	(Enables stall prevention function wi th brakingresistor)

Set L8-01 to "1" before operating the Inverter with the braking resistor without thermal overload relay trip contacts.
The Braking Resistor Unit cannot be used and the deceleration time cannot be shortened by the Inverterif L3-04 is set to "1" (i.e., if stall prevention is enabled for deceleration).
To prevent the Unit from overheating, design the sequence to turn OFF the power supply for the thermal overload relay trip contacts of the Unit as shown in Figure 3.15.

400V class inverter with 3. 7 to 15kw output



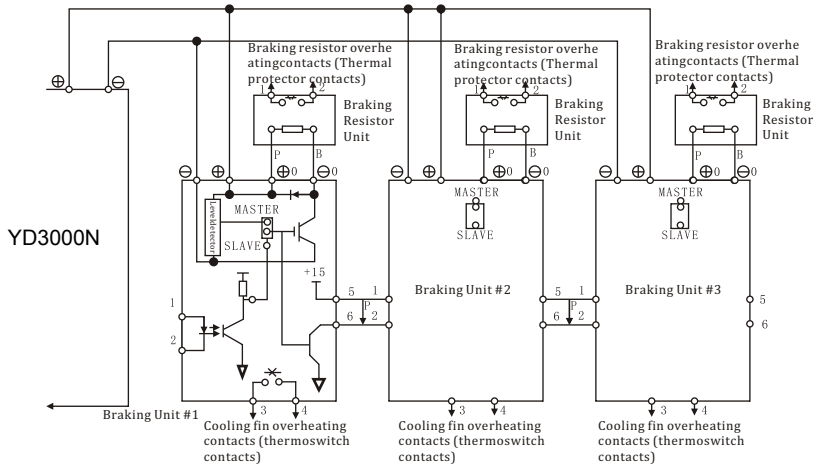
400 V Class Inverters with 18.5 or higher Output



Connecting the Braking Resistor Unit and Braking Unit

Connecting Braking Units in Parallel

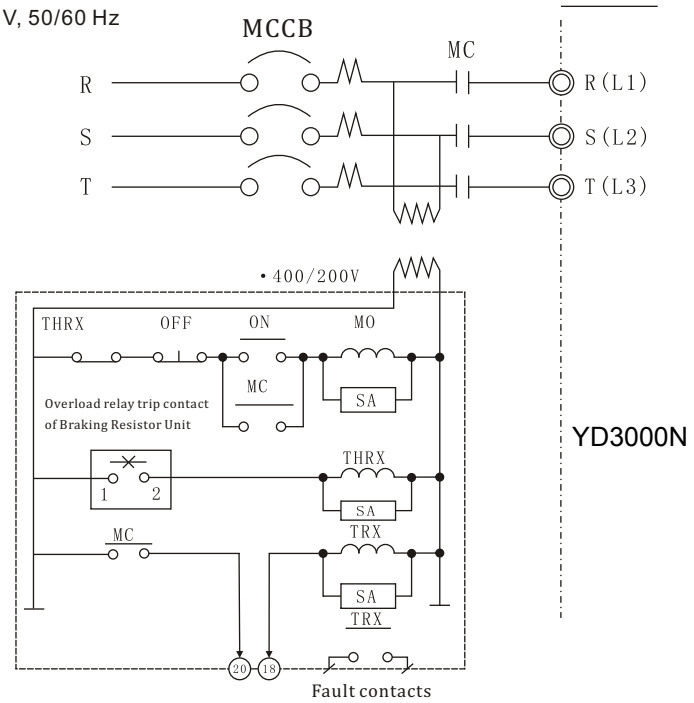
When connecting two or more Braking Units in parallel, use the wiring and connectors shown in Figure3.16. There are connectors for selecting whether each Braking Unit is to be a Master or Slave. Select "Master"for the first Braking Unit only, and select "Slave" for all other Braking Units (i.e., from the second Unit onwards).



Connecting Braking Units in Parallel

Power Supply Sequence

Three-phase power:
380 to 400 V, 50/60 Hz



Power Supply Sequence

3.4 Wiring Control Circuit Terminals

A control signal line must not be longer than 50 m and must be separated from power lines.
The frequency reference must be input to the Inverter through twisted-pair wires.

3.4.1 Wire Sizes and Closed-loop Connectors

Terminal numbers and wire sizes are shown in Table 3.7.

Table 3.7 Terminal Numbers and Wire Sizes (Same for all Models)

Terminals	Terminal Screws	Wire Thickness [mm2]	Wire Type
1~11, 13~33	M3.5	Stranded wire: 0.5 to1.25 Single wire: 0.5 to 1.25	● Shielded, twisted-pair wire ●Shielded, polyethylene-cove red, vinyl sheathcable
12 (G)	M3.5	0.5~2	

The closed-loop connectors and tightening torques for various wire sizes are shown in Table 3.8.

Table 3.8 Closed-loop Connectors for Ground Terminal

Wire Thickness [mm2]	Terminal Screws	Crimp Size	Tightening Torque (N G m)
0.5	M3.5	1.25~3.5	0.8
0.75		1.25~3.5	
1.25		1.25~3.5	
2		2~3.5	

3.4.2 Control Circuit Terminal Functions

The functions of the control circuit terminals are shown in Table 3.9. Use the appropriate terminals for the correct purposes.

Table 3.9 Control Circuit Terminals

Type	No.	Signal Name	Function		Signal Level
Se-quence input signals	1	Forward run/stop command	Forward run when CLOSED; stopped when OPEN.		24 VDC, 8 mA Photocoupler isolation
	2	Reverse run/stop command	Reverse run when CLOSED; stopped when OPEN.		
	3	External fault input	Fault when CLOSED; normal when OPEN.	Multi-function contact inputs (Command signals can be selected by setting H1-01 to H1-06.)	
	4	Fault reset	Reset when CLOSED		
	5	Multi-step speed reference 1 (Master/auxiliary switch)	Auxiliary frequency reference when CLOSED.		
	6	Multi-step speed reference 2	Multi-step setting 2 when CLOSED.		
	7	Jog frequency reference	Jog run when CLOSED.		
	8	External baseblock	Inverter output stopped when CLOSED.		
	11	Sequence input common	—		
Analog input signals g	15	15 V power output	15 V power supply for analog references		15 V (Max. current: 20 mA)
	33	−15 V power output	15 V power supply for analog references		−15 V (Max. current: 20 mA)
	13	Master speed frequence reference	−10~+10V/−100%~+100% 0~+10V/100%		−10~+10V (20kΩ) 0~+10V (20kΩ)
	14		4~20mA/100%, −10~+10V/−100%~+100% 0~10V/100%		4~20mA (250kΩ)
	16	Multi-function analog input	−10~+10V/−100%~+100% 0~+10V/100%	Auxiliary analog input (H3-05)	−10~+10V (20kΩ) 0~+10V (20kΩ)
	17	Control common	—		—
	12	Shield wire, optional ground line connection point	—		—
Se-quence quence output signals	9	Running signal (1NO contact)	Operating when CLOSED	Mlifi Multi-function outputs	Dry contacts Contact capacity: 1 A max. at 250 VAC 1 A max. at 30 VDC
	10				
	25	Zero speed detection	Zero level (b2-01) or below when CLOSED		
	26	Speed agree detection	Within ±2 Hz of set frequency when CLOSED.		Open-collector output 50 mA max. at 48 V*
	27	Open-collector output commor			
	18	Fault output signal (SPDT)	Fault when CLOSED across 18and20 Fault when OPEN across 19 and 20		Dry contacts Contact capacity: 1 A max at 250 VAC max. 1 A max. at 30 VDC
	19				
	20				
Analog output signals	21	Frequency output	0 to 10 V/100% frequency	Multi-function analog monitor1 (H4-01, H4-02)	0 to10max. ± V 5% 2 mA max
	22	Common	—		
	23	Current monitor	5 V/Inverter's rated current	Multi-function analog monitor2 (H4-04,H4-05)	

* When driving an L load, such as a relay coil, always insert a flywheel diode as shown in Figure 3.18.

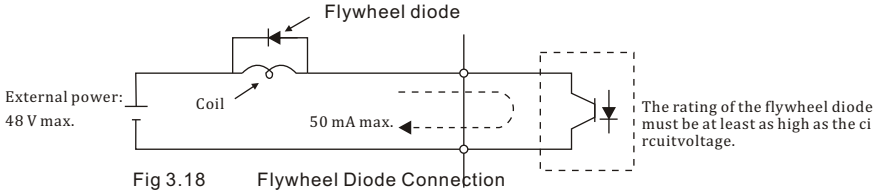


Fig 3.18 Flywheel Diode Connection

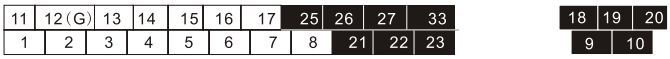


Fig 3.19 Control Circuit Terminal Arrangement

3.4. 3 Control Circuit Wiring Precautions

- Separate control circuit wiring (terminals 1 to 33) from main circuit wiring (terminals R, S, T, B1 , B2,U, V, W, ©, ¨1, ¨2, and ¨3) and other high-power lines.
- Separate wiring for control circuit terminals 9, 10, 18, 19, and 20 (contact outputs) from wiring for terminals 1 to 8, 21, 22, 23, 25, 26, 27, 33 and 11 to 17.
- Use twisted-pair or shielded twisted-pair cables for control circuits to prevent operating faults. Processcable ends as shown in Figure 3.21.
- Connect the shield wire to terminal 12(G).
- Insulate the shield with tape to prevent contact with other signal lines and equipment.

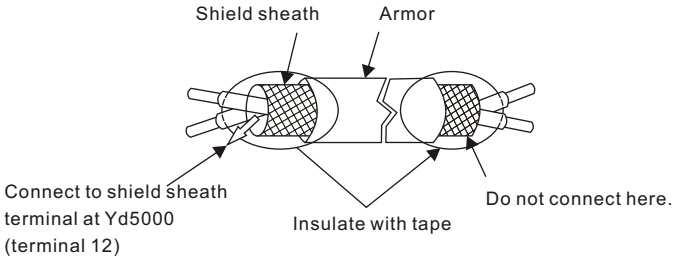


Fig 3.21 Processing the Ends of Twisted-pair Cables

3.6 Wiring Check

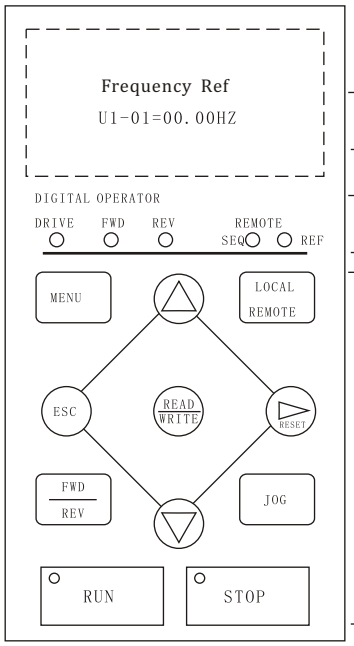
Check all wiring after wiring has been completed. Do not perform a buzzer check on control circuits.

- Is all wiring correct?
- Have any wire clippings, screws, or other foreign material been left?
- Are all screws tight?
- Are any wire ends contacting other terminals?

4 Operator

4 1 Using the Digital Operator

This section describes the component names and functions of the Digital Operator. The component names and functions are shown in Figure 4.1 and Key functions are described in Table 4.1.



Data Display y

Two-line LCD that displays data for monitoring, ,user constants, ,and set values with 16 characters per line. .

Operation Mode Indicators

DRIVE: Lit when in operation mode.
FWD: Lit when there is a forward run command input.
REV: Lit when there is a reverse run command input.
SEQ: Lit when the run com and from the control circuit terminal is enabled. .
REF: Lit when the frequency reference from control circuit terminals 13 and 14 is enabled.

Keys

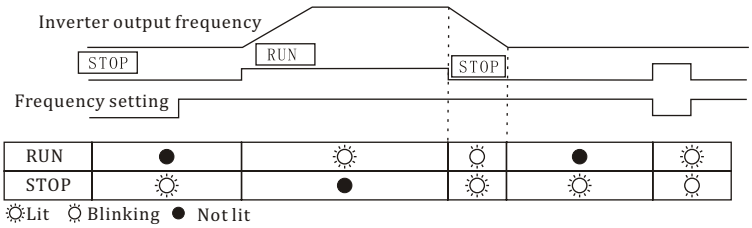
Execute operations such as setting user constants, monitoring, JOG, and autotuning. .

Digital Operator Component Names and Functions

Key Functions

Key	Name	Function
LOCAL / REMOTE	LOCAL/REMOTE Key	Switches between operation (LOCAL) via the Digital Operator and control circuit terminal (REMOTE) operation. This Key can be enabled or disabled by setting a user constant (o2-01).
MENU	MENU Key	Displays menus.
ESC	ESC Key	Returns to the status before the DATA/ENTER Key was pressed.
JOG	JOG Key	Enables jog operation when the Yd3000N is being operated from the Digital Operator.
FWD / REV	FWD/REV Key	Selects the rotation direction of the motor when the Yd5000 is being operated from the Digital Operator.
RESET	RESET Key	Sets the number of digits for user constant settings. Also acts as the reset Key when a fault has occurred.
△	Increment Key	Selects menu items, groups, functions, and user constant names, and increments set values.
▽	Decrement Key	Selects menu items, groups, functions, and user constant names, and decrements set values.
READ / WRITE	DATA/ENTER Key	Enters menu items, functions, constants, and set values after they are set.
RUN	RUN Key	Starts the YD3000N operation when the Yd3000N is in operation with the Digital Operator.
STOP	STOP Key	Stops Yd3000N operation. This Key can be enabled or disabled by setting a user constant (o2-02) when operating from the control circuit terminal.

Note Except in diagrams, Keys are referred to using the Key names listed in the above table.



The RUN and STOP indicators light and blink to indicate operating status.
During DB (initial excitation), RUN blinks and STOP is turned ON.

4.2 Using the Digital Operator

The YD5000 Inverter's user constants and monitoring functions have been organized in groups called modes that make it easier to read and set user constants.
The Yd5000 is equipped with 5 modes, as shown in the Table 4.2.

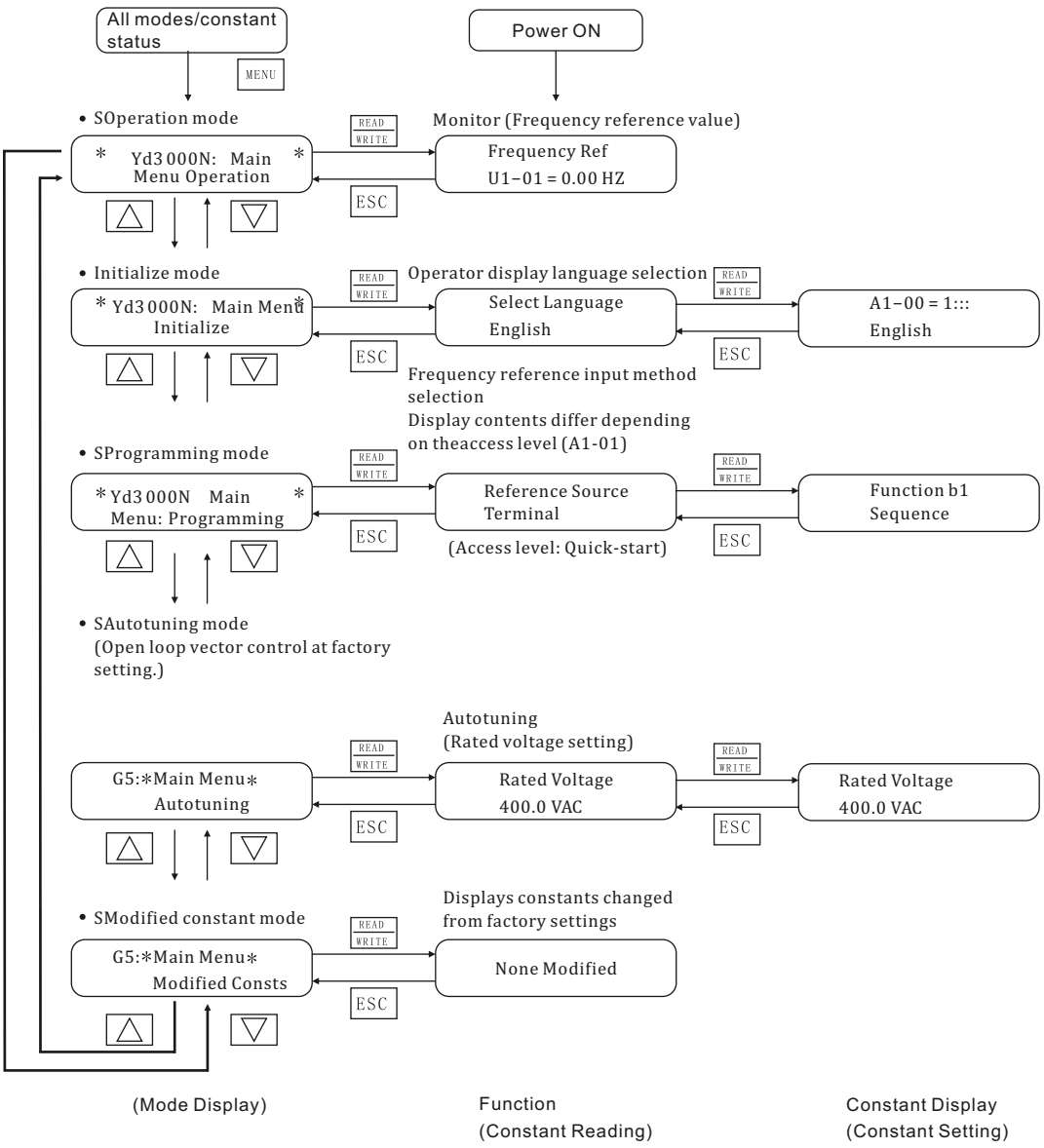
Table 4.2 Modes

Mode	Primary function(s)
Operation mode	The Inverter can be run in this mode. Use this mode when monitoring values such as frequency references or output current, displaying fault information, or displaying the fault history.
Initialize mode	Use this mode when selecting the language displayed on the Digital Operator, selectingthe access level for reading/setting user constants, selecting the control mode, or initializing the user constants.
Programming mode	Use this mode when reading/setting the user constants required for operation. The program-mode functions are subdivided into the following groups: • Application: Operation mode selection, DC control, speed search, etc. • Tuning: Acceleration/deceleration times, S-curve characteristics, carrierfrequencies, etc. • Reference: Settings related to frequency control • Motor: V/f characteristics and motor constants • Option: Settings for Optional Cards • Terminal: Settings for sequential I/O and analog I/O • Protection: Settings for the motor and inverter protection functions • Operator: Selects the Digital Operator's display and Key functions
Autotuning mode (See note)	(Usable only with in vector control mode) Use this mode when running a motor with unknown motor constants in the vector control mode. The motor constants are calculated and set automatically.
Modified constants mode	Use this mode to read/set user constants that have been changed from their factor ysetvalues.

✻Note Always perform autotuning before operating in vector control mode. Refer to5.2.5 Autotuning and 6.4.3 Autotuning for details.

4.2.2 Switching Modes

Once the Inverter has been put into operation mode by pressing the Menu Key, the Increment and Decrement Keys can be pressed to switch to other modes. Press the DATA/ENTER Key to read/set the userco nstants in each mode.
Press the ESC Key to return to the mode display from the user constant display.
Press the DATA/ENTER Key twice to write a constant and then press the ESC Key to return to the modedisplay. This is the most Basic operation, so you should remember it.



4.2.3 User Constant Access Levels

The YD3000N has three access levels which divide the various user constants based on their applications, as shown below. The access level restricts which user constants can be set or displayed.

Quick-start	Allows reading/setting of user constants required for simple operation. (factory preset)
Basic	Allows reading/setting of Basic user constants.
Advanced	Allows reading/setting of all user constants.

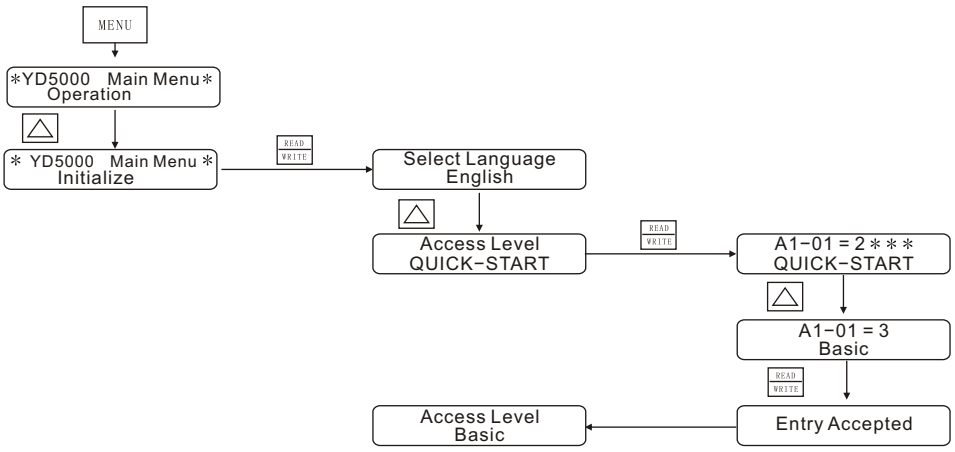
Set the access level in initialize mode with user constant A1-01.

■ Changing the Access Level from Quick-start to Basic

The Inverter is set at the factory to start in the Quick-start access level. Use the following procedure tochange from the Quick-start level to the Basic level.

Step	Key Sequence	Digital Operator Display	Remarks
1	MENU	* YD3 000N Main Menu * Operation	
2	△	* YD3 000N Main Menu* Initialize	
3	READ WRITE	Select Language English	
4	△	Access Level QUICK-START	
5	READ WRITE	A1-01 = 2 * * * QUICK-START	
6	△	A1-01 = 3 Basic	
7	READ WRITE	Entry Accepted	After approx. 3 seconds, the Operatordisplay is as show n on the left.
		Access Level Basic	

As shown above, Quick-start has changed to Basic.
These seven steps can be illustrated as when in Figure 4.4.



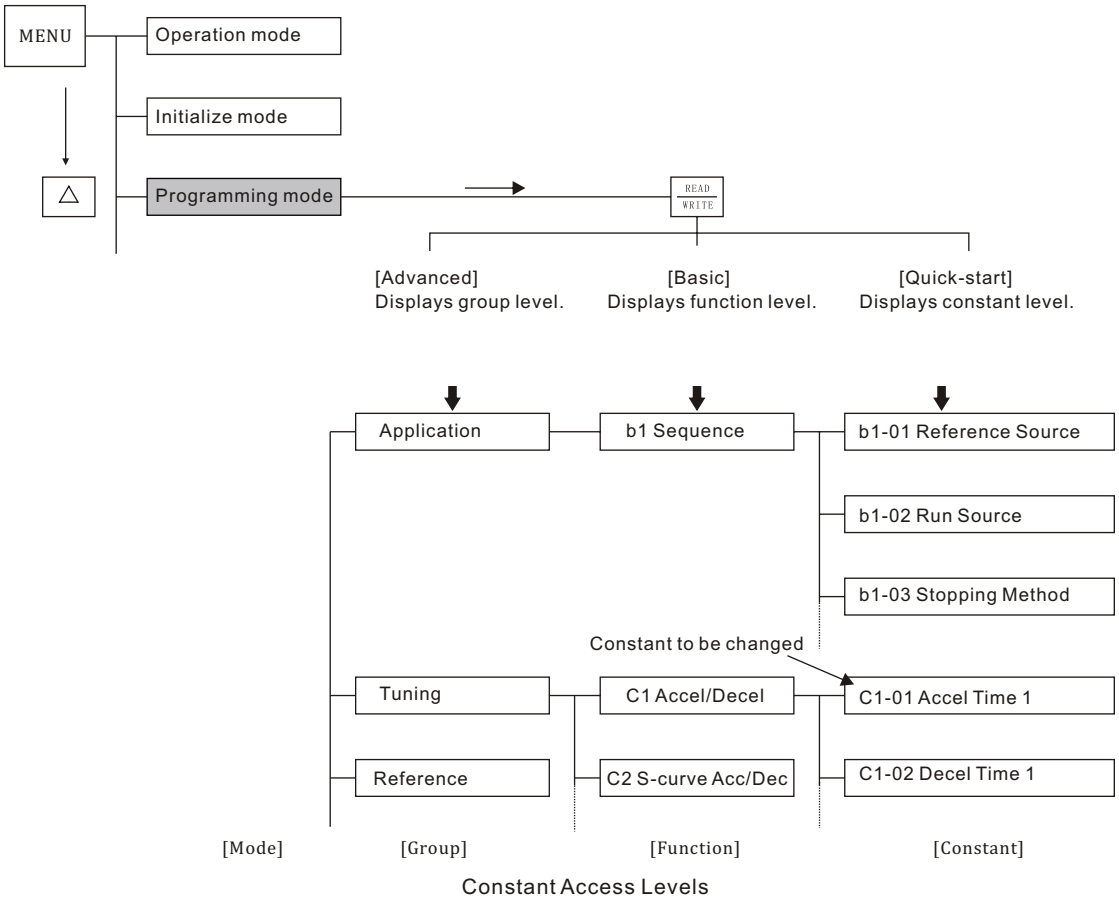
Changing Quick-start to Basic

■ Setting User Constants in Each Access Level

The displayed access level will change when programming mode is selected. The display will not changefor access levels in operation mode, initialize mode, autotuning mode, and modified cons tants mode.

This section provides the procedure to change the acceleration time to 20.0 s in each access leve . The acceleration time (C1-01) is a user constant in programming mode.

If the new user constant setting is not written to the Unit by pressing the DATA/ENTER Key within oneminute after starting the procedure, the display will automatically revert to the original user constant setting. In this case, the procedure must be started again.



Constant Access Levels

4.2.4 Operation Mode

Operation mode is the mode in which the Inverter can be operated.
Many user constants can't be changed when the Inverter is operating. Refer to User Constant List for deta ils.
The following monitor displays are possible in operation mode: The frequency reference, output frequency,output current, and output voltage, as well as fault information and the fault history.

IMPORTANT

When running the Inverter after using digital operator, press the MENU Key to enter the operation mode andthen press the DATA/ENTER Key from the operation mode display to bring up the monitor display.Run commands can't be received from any other display. (Monitor display in the operation mode appears when the po wer is turned ON.)

■ **Operations in Operation Mode**

Key operations in operation mode are shown in Figure 4.6.

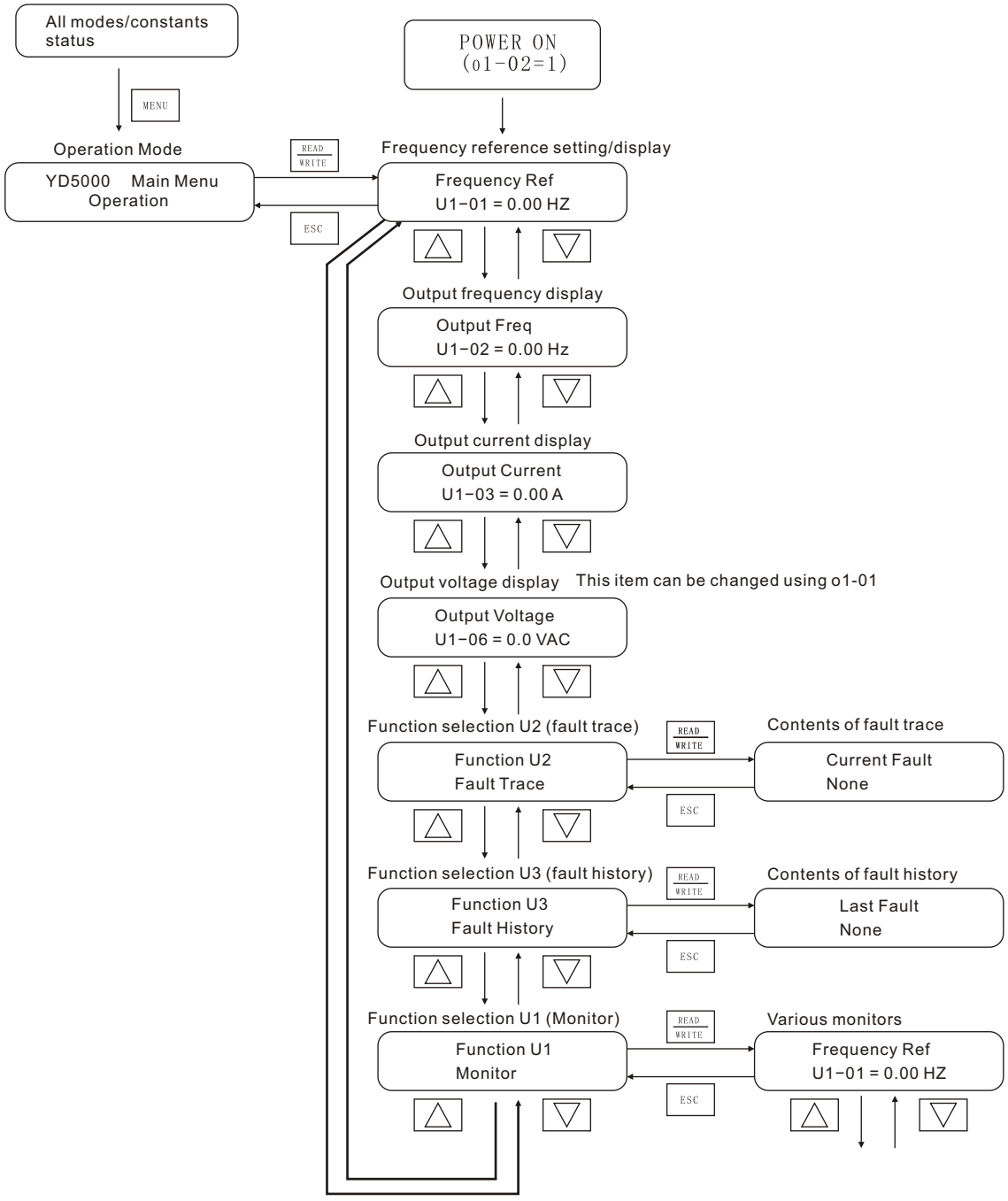


Fig 4.6 Operations in Operation Mode

Conditions for Monitoring

Table 4.3 shows the items that can be monitored in operation mode.

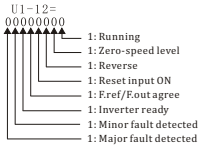
The "Valid access levels" column in the table indicates whether an item can be monitored in a particularaccess level and control method. The codes in this column have the following meanings.

Q	Items that can be monitored in all access levels. (Quick-start, Basic, and Advanced)
B	Items that can be monitored in the Advanced and Basic access levels.
A	Items that can be monitored only in the Advanced access level.
X	Items that cannot be monitored in the control mode shown.

The output signal levels for multi-function analog outputs shown in the table are for a gain of 100.0 and a bias of 0.00.

Table 4.3 Constants Monitored in Operation Mode

Function	Constant No.	Name	Function	Output Signal Levels for Multi-function Analog Outputs	Min. Unit	Valid Access Levels			
		Digital Operator Display				V/f	V/f w/ PG	Open-loop Vector	Flux Vector
Status Monitor	U1-01	Frequency reference Frequency Ref	Monitors/sets the frequency referencevalue. The display units can be set w ithuser constant o1-03.	10 V: Max. frequency 0to ±10Vpossible)	0.01Hz	Q	Q	Q	Q
	U1-02	Output frequency Output Freq	Monitors the output frequency. The display units can be set wi thuser constant o1-03.	10 V: Max. frequency 0 to ±10 V possible)	0.01Hz	Q	Q	Q	Q
	UP-03	Output current Output Current	Monitors the output current.	10 V: Rated current 0 to +10 V output)	0.01A	Q	Q	Q	Q
	U1-04	Control method Control Method	Shows which control mode is set.	Can't be output	—	Q	Q	Q	Q
	U1-05	Motor speed Motor Speed	Monitors the motor speed. The display unit setting can be changed using o1-03.	10 V: Max. frequency 0 to ±10 V possible)	0.01Hz	×	Q	Q	Q
	U1-06	Output voltage Output Voltage	Monitors the Inverter's internal output voltage reference value.	10 V: 200 (400) VAC 0 to +10 V output)	0.1V	Q	Q	Q	Q
	U1-07	DC bus voltage DC Bus Voltage	Monitors the DC voltage of the Inverter's internal main circuit.	10 V: 400 (800) VDC 0 to +10 V output)	1V	Q	Q	Q	Q
	U1-08	Output power Output kWatts	Monitors the output power. This is an internally detected value.)	10 V: Max.motorcapacity 0 to ±10 V possible)	0.1KW	Q	Q	Q	Q
	U1-09	Torque reference Torque Reference	Monitors the internal torque reference value when vector con is used.	10 V: Rated torque 0 to ±10 V possible)	0.1%	×	×	Q	Q
	U1-10	Input terminal status Input Term Sts	Shows input ON/OFF status. U1-10=00000000 1: Terminal 1 ON 1: Terminal 2 ON 1: Terminal 3 ON 1: Terminal 4 ON 1: Terminal 5 ON 1: Terminal 6 ON 1: Terminal 7 ON 1: Terminal 8 ON	Can't be output.	—	Q	Q	Q	Q
	U1-11	Output terminal status Output Term Sts	Shows output ON/OFF status. U1-11=00000000 1: Terminals 9-10 ON 1: Terminal 25 ON 1: Terminal 26 ON Not used. (always 0) 1: Terminals 18/19-20 ON	Can't be output.	—	Q	Q	Q	Q

Function	Constant No.	Name	Function	Output Signal Levels for Multi-function Analog Outputs	Min. Unit	Valid Access Levels			
		Digital Operator Display				V/f	V/f w/ PG	Open-loop Vector	Flux Vector
Status Monitor	U1-12	Operation status Int Ctl Sts 1	Inverter operating status. 	Can't be output.	—	Q	Q	Q	Q
	U1-13	Cumulative operationtime Elapsed Time	Monitors the Inverter's elapsed operating time. The initial value and running/ power-on time selection can be set with user constants o2-07 and o2-08.	Can't be output.	1小时	Q	Q	Q	Q
	U1-14	Software No. FLASH ID	Manufacturer's ID number	Can't be output.	—	Q	Q	Q	Q
	U1-15	Terminal 13 input voltage level Term 13 Level	Monitors the input voltage of the frequency reference (voltage). An input of 10 V corresponds to 100%.	10 V: 100% (10 V) (0to ±10 V possible)	0.1%	B	B	B	B
	U1-16	Terminal 14 input current level Term 14 Level	Monitors the input current of the frequency reference (current). An input of 20mA corresponds to 100%.	20 mA: 100% (20 mA) (0 to +10 V output)	0.1%	B	B	B	B
	U1-17	Terminal 16 input voltage level Term 16 Level	Monitors the input voltage of the multi-function analog input. An input of 10 V corresponds to 100%.	10 V: 100% (10 V) (0 to +10 V output)	0.1%	B	B	B	B
	U1-18	Motor secondarycurrent (Iq) Mot SEC Current	Monitors the calculated value of themotor'ssecondary current(Iq). The motor's rated secondary current corresponds to 100%.	10 V: Rated secondary current (0 to +10 V output)	0.1%	B	B	B	B
	U1-19	Motor exciting current(Id) Mot EXC Current	Monitors the calculated value of the motor'sexcitation current(Id). The motor's rated secondary current corresponds to 100%.	10 V: Rated secondary current (0 to +10 V output)	0.1%	X	X	B	B
	U1-20	Output frequency after soft-start SFS Output	Monitors the output frequencyafter a soft start. The display shows the frequency without the correction fromcompensation functions such asslip compensation.	10 V: Max. Frequency (0 to +10 V possible)	0.1Hz	A	A	A	A
	U1-21	ASR input ASR Input	Monitors the input to the speed control loop. The max. frequency corresponds to 100%.	10 V: Max. Frequency (0 to +10 V possible)	0.1%	X	A	X	A
	U1-22	ASR output ASR Output	Monitors the output from the speed control loop. The motor's rated secondary current corresponds to 100%.	10 V: Rated secondary current (0 to +10 V possible)	0.1%	X	A	X	A
	U1-23	Speed deviation Speed Deviation	Monitors the speed deviation within the speed control loop. The max. frequency corresponds to 100%.	10 V: Max. Frequency (0 to +10 V possible)	0.1%	X	A	X	A
	U1-24	PID feedback value PID Feedback	Monitors the feedback value when PID control is used. The input for the max. frequency corresponds to 100%.	10 V: Max. Frequency (0 to +10 V possible)	0.1%	A	A	A	A
	U1-25	DI-16H2 input status DI-16 Reference	Monitors the reference valuefrom a YD5000-DI16H2 DigitalReference Card. The value will be displayed inbinary or BCD depending onuser constant F3-01.	Can't be output. Cant	—	A	A	A	A
	U1-26	Output voltage reference(Vq) Voltage Ref (Vq)	Monitors the Inverter's internal voltage reference value for the motor's secondary current control.	10 V: 200 (400) VAC (0 to +10 V possible)	0.1%	X	X	A	A
	U1-27	Output voltage reference(Vd) Voltage Ref (Vd)	Monitors the Inverter's internal voltage reference value for the motor's excitation current control.	10 V: 200 (400) VAC (0 to +10 V possible)	0.1%	X	X	A	A

Function	Constant No.	Name	Function	Output Signal Levels for Multi-function Analog Outputs	Min. Unit	Valid Access Levels			
		Digital Operator Display				V/f	V/f w/ PG	Open-loop Vector	Flux Vector
Status Monitor	U1-28	Software No. (CPU) CPU ID	Manufacturer's CPU software ID number	Can't be output.	0.1V	A	A	A	A
	U1-32	ACR output of q axis ACR (q) Output	Monitors current control output value for motor's secondary current.	10 V: 100%	0.1%	X	X	A	A
	U1-33	ACR output of d axis ACR (d) Output	Monitors current control output value for motor's excitation current.	10 V: 100%	0.1%	X	X	A	A
	U1-34	OPE fault constant OPE Detected	Shows the first constant number where an OPE fault is detected.	Can't be output.	—	A	A	A	A
	U1-35	Zero servo movement pulses	Shows the number of PG pulses for the movement range at the stop point for a zero servo times 4.	Can't be output.	0.1%	X	X	X	A
	U1-36	PID input volume PID Input	PID command + PID command bias -PID feedback volume. The input for the max. frequency corresponds to 100%.	10V: Max frequency	0.01%	A	A	A	A
	U1-37	PID output volume PID Output	PID control output. The input for the max. frequency corresponds to 100%.	10V: Max frequency	0.01%	A	A	A	A
	U1-38	PID command PID Setpoint	PID command + PID command bias. The input for the max. frequency corresponds to 100%.	10V: Max frequency	0.01%	A	A	A	A
Fault trace (See note.)	U2-01	Current fault Current Fault	Information on the current fault		—	Q	Q	Q	Q
	U2-02	Last fault Last Fault	Information on the last fault		—	Q	Q	Q	Q
	U2-03	Frequency reference at fault Frequency Ref	Frequency reference value when the "last fault" occurred.		0.01Hz	Q	Q	Q	Q
	U2-04	Output frequency at fault Output Freq	Output frequency when the "last fault" occurred.		0.01Hz	Q	Q	Q	Q
	U2-05	Output current at fault Output Current	Output current when the "last fault" occurred.		0.1A	Q	Q	Q	Q
	U2-06	Motor speed at fault Motor Speed	Motor speed when the "last fault" occurred.	Can't be output.	0.01Hz	X	Q	Q	Q
	U2-07	Output voltage reference at fault Output Voltage	Output voltage when the "last fault" occurred.		0.1V	Q	Q	Q	Q
	U2-08	DC bus voltage at fault DC Bus Voltage	The main circuit DC voltage when the "last fault" occurred.		1V	Q	Q	Q	Q
	U2-09	Output power at fault Output kWatts	Output power when the "last fault" occurred.		0.1KW	Q	Q	Q	Q
	U2-10	Torque reference at fault Torque Reference	Torque reference when the "last fault" occurred. (The rated torque = 100%.)		0.1%	X	X	Q	Q
	U2-11	Input terminal status at fault Input Term Sts	Input terminal status when the "last fault" occurred. (Same format as U1-10.)		—	Q	Q	Q	Q

Function	Constant No.	Name	Function	Output Signal Levels for Multi-function Analog Outputs	Min. Unit	Valid Access Levels			
		Digital Operator Display				V/f	V/f w/ PG	Open-loop Vector	Flux Vector
Fault trace (See note.)	U2-12	Output terminal status at fault Output Term Sts	Output terminal status when the "last fault" occurred. (Same format as U1-11.)		—	Q	Q	Q	Q
	U2-13	Operation status at fault Inverter status	Inverter operating status when the "last fault" occurred. (Same format as U1-12.)	Can't be output.	—	Q	Q	Q	Q
	U2-14	Cumulative operation time at fault Elapsed time	Elapsed operating or power-on time when the "last fault" occurred.		1 hr	Q	Q	Q	Q
Fault history (See note.)	U3-01	Most recent fault Last Fault	Information on the last fault.		—	Q	Q	Q	Q
	U3-02	Second most recentfault Fault Message 2	Information on the 2nd to last fault.		—	Q	Q	Q	Q
	U3-03	Third most recent fault Fault Message 3	Information on the 3rd to last fault.		—	Q	Q	Q	Q
	U3-04	Fourth/oldest fault Fault Message 4	Information on the 4th to last fault.		—	Q	Q	Q	Q
	U3-05	Cumulative operation time at fault Elapsed Time 1	Elapsed running or power-on time when the last fault occurred.	Can't be output.	1 hr	Q	Q	Q	Q
	U3-06	Accumulated time of second fault Elapsed Time 2	Elapsed running or power-on time when the 2nd to last fault occurred.		1 hr	Q	Q	Q	Q
	U3-07	Accumulated time of third fault Elapsed Time 3	Elapsed running or power-on time when the 3rd to last fault occurred.		1 hr	Q	Q	Q	Q
	U3-08	Accumulated time of fourth/oldest fault Elapsed Time 4	Elapsed running or power-on time when the 4th to last fault occurred.		1 hr	Q	Q	Q	Q

Note Faults CPF00, 01, 02, 03, UV1 and UV2 are not recorded in the fault history.

■ Monitoring at Startup

In operation mode, the frequency reference, output frequency, output current, and output voltage can bemonitored immediately if the factory presets are being used. One of these four values, the output voltage,can be changed to a different monitor item. When an item other than the output voltage is to be monitored,set that value in user constant o1-01 (Monitor selection). Refer to the example procedure given later in thismanual.

When the power is turned ON, the frequency reference will appear in the Unit's data display if the factorpresets are being used. Any one of the four values monitored at startup (frequency reference, output fre−quency,output current, or the value set in user constant o1-01) can be selected to appear when the poweris turned ON.

The value that appears at startup is determined by user constant o1-02 (Monitor selection after power up).

User constants o1-01 and o1-02 can be changed in the Basic or Advanced access levels. These user consta−

Nts can be changed during operation.

■ Monitor Displays

The following notation is used in this manual when describing user constants.

User Constant Number	Display Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f	V/f w/ PG	Open -loop Vec- tor	Flux Vec- tor
o1-01	Monitor selection	0	4~38	–	6	B	B	B	B

Use the last two digits from the U1 Monitor list (U1- □□) to select a value. For example, the torque reference is U1-09, so input 9 to select the torque reference.

Change during Operation	Indicates whether or not the constant can be changed during operation.	
	0	Can be changed during operation.
	X	Cannot be changed during operation.
Setting Range	The setting range for the constant.	
Units	The unit used to set the constant ("–" indicates that no unit is used).	
Factory Setting	The value preset at the factory. (There are different factory settings for each control meth od,i.e., if the control method is changed, the factory setting can also change.)	
PG V/f	Indicates the control methods and access levels under which the constant can be accessed and set.	
	Q	Accessible/settable under all access levels (Quick-start, Basic, and Advanced).
	B	Accessible/settable under Advanced or Basic access levels.
	A	Accessible/settable under Advanced access level.
	X	Not accessible/settable in the specified control method.

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f	V/f w/ PG	Open -loop Vec- tor	Flux Vec- tor
o1-02	Monitor selection after power up	0	1~4	—	1	B	B	B	B

Use constant o1-02 to indicate which value will be displayed when the Inverter is started. Refer to the followingtable.

Monitor Display Contents at Startup

Setting	Contents
1	Indicates the frequency reference at startup.
2	Indicates the output frequency at startup.
3	Indicates the output current at startup.
4	Indicates the value set in user constant o1-01 at startup.

4.3 Procedure

Perform trial operation according to the following operational flow.

Item	
Installation andMounting ↓	Install the Inverter according to the installation conditions. Ensure that the installation conditions are met.
Wiring and Connection ↓	Connect to the power supply and peripheral devices. Select peripheral devices which meet the specifications and wire correctly.
Power ON ↓	Carrying out the following pre-connection checks before turning ON the power supply: • Always ensure that a power supply of the correct voltage is used and that the power input t • erminals (R, S, T)are wired correctly. 400 V class: 3-phase 380 to 460 VDC, 50/60 Hz • Make sure that the Motor output terminals (U, V, W) and the Motor are connected correctly. • Make sure that the control circuit terminals and the control device are wired correctly. Mak e sure that all control circuit terminals are turned OFF. • When using a PG Speed Control Card, ensure that it is wired correctly. • Set the motor to no-load status, (not connected to the mechanical system). Having conducted the above checks, connect the power supply.
Check the Display Status ↓ *1	Check to be sure that there are no faults in the Inverter. • If the display at the time the power is connected is normal, it will read as follows:Data Display: Frequency Ref • When an fault has occurred, the details of the fault will be displayed. In that case, refer to Sectio n 9 Maintenance Operations.
Setting the Input Voltage ↓	Set the Inverter input voltage (E1-01) to the correct voltage.
Set the Motor ↓	Set the proper motor protection (E1-02).
Autotuning *2 ↓	Execute autotuning for the motor separately before operating in open-loop vector control or Flux v ector control modes. • When autotuning is executed, motor constants are set automatically. • When this is not possible using autotuning, switch to V/f control mode and set the V/f pattern.
No-load Operation ↓	Start the no-load motor using the Digital Operator. • Set the frequency reference using the Digital Operator and start the motor using key sequences.
Actual Load Operation ↓	Connect the mechanical system and operate using the Digital Operator. • When there are no difficulties using the no-load operation, connect the mechanical system to the motor and operateusing the Digital Operator.
Operation	Basic Operation: Operation based on the basic settings required to start and stop the Inverter. Advanced Operation: Operation which uses PID control or other functions. • For operation within standard constants select “Basic Operation.” • To use the various applied functions such as, direct current control braking, speed search, timer, S -curve acceleration/deceleration, slip compensation, torque compensation, droop control, zero-s ervo, and torque control,select “Advanced Operation” in combination with “Basic Operation.”

* 1 It is sometimes necessary to initialize constants after checking the display status.

Initializing Constants	Initialize the constants. • Check the Inverter capacity setting (kVA) in o2-04 before replacing the controller PCB with a spare.

4. 3 Trial Operation Procedures

4. 3. 1 Power ON

■ **Checkpoints before Turning ON the Power Supply**

- Check that the power supply is of the correct voltage.
  400 V class: 3-phase 380 to 460 VDC, 50/60 Hz
  Make sure that the motor output terminals (U, V, W) and the motor are connected
- correctly. Make sure that the Inverter control circuit terminal and the control device are
- wired correctly. Set all Inverter control circuit terminals to OFF.
- When using a PG Speed Control Card, make sure that it is wired correctly.
- Make sure that the motor is not connected to the mechanical system (no-load status)
-

4. 3. 2 Checking the Display Status

If the Digital Operator's display at the time the power is connected is normal, it will read as follows:

[Normal] Frequency Ref U1−01 = 0.00 HZ — The frequency reference monitor is displayed in the data display section.

When an fault has occurred, the details of the fault will be displayed instead of the above display. In that case, refer to Section 9 Maintenance Operations. The following display is an example of a fault display.

[Fault] UV Under Voltage — The display will differ depending on the type of fault.

4. 3.3 Initializing Constants

- When replacing the controller PCB, check the Inverter capacity (kVA) in o2-04 first and then initialize constants to the factory settings. There is no need to initialize constants the first time trial operation is performed after purchasing the Inverter.
- To initialize the constants, set "2220" in A1-03 (Initialize).
- After initialization, the access level is set to Quick-start (A1-01). The following table shows the setting method for Quick-start.
  Use the following procedure to initialize constants.

Step	Key Sequence	Digital Operator Display	Remarks
		Frequency Ref U1-01 = 0.00 HZ	
1	MENU	*YD5000 Main Menu* Operation	Displays operation mode.
2	^	*YD5000 Main Menu* Initialize	Displays initialize mode.
3	DATA ENTER	Select Language English	Puts the Inverter in initialize m ode.
4	^	Initialize Select	Displays the Initialize display.
5	Press 3 times. DATA ENTER	A1-03 = 0 * * Select	Displays the constant setting for A1-03.
6	^	A1-03 = 2220 2-wire Initial	Initializes for a 2-wire sequence.
7	DATA ENTER	Entry Accepted * Initialize	Writes the set values. "Entry Ac cepted"is displayed for approxi mately0.5 seconds.
		Select YD3000N Main Menu*	Returns to the Initialize display.
8	ESC	Initialize	Returns to the initialize mode di splay.

4. 3. 4 Setting Input Voltage

Set the input voltage of the Inverter (E1-01) according to the power supply voltage.

■ **Input Voltage: E1-01**

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f	V/f w/ PG	Open -loop Vec- tor	Flux Vec- tor
E1-01	Input voltage setting	×	310-510	VAC	400	Q	Q	Q	Q

* Values in parentheses are for 400 V class Inverters.

Step	Key Sequence	Digital Operator Display	Remarks
		Main Menu Initialize	Displays initialize mode.
1	^	Main Menu Programming	Displays programming mode. Puts the Unit in programming mode.
2	DATA ENTER	Frequency Ref Terminal	Displays the input voltage setting display.
3	^	Input Voltage E1-01 = 400 VAC	The leading digit will blink The 2nd digit will blink.
4	DATA ENTER	Input Voltage 400 VAC	Set to "3" The set value is overwritten. "Entry
Press 10 times 5	RESET	Input Voltage 400 VAC	Accepted" is displayed for approximately 0.5 seconds.
6	^	Input Voltage 420 VAC	Returns to the input voltage display.
Press 3 times 7	DATA ENTER	Entry Accepted	Check that the data has been updated. Returns to the programming modedisplay.
		Input Voltage E1-01 = 420 VAC	
8	ESC	Main Menu Programming	

■ Motor Selection (Motor Overheating Protection): E1-02

Set the type of motor being used with the motor selection constant (E1-02). This setting is a reference for the motor overheat protection.

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f	V/f w/ PG	Open -loop Vec- tor	Flux Vec- tor
E1-02	Motor selection (motor overheatingprotection)	×	0~2	-	0	Q	Q	Q	Q

E1-02 Settings

Setting	Function
0	Standard motor (general-purpose motor)
1	Special motor (inverter-exclusive motor)
2	Special motor (vector-exclusive motor)

4.2.5 Autotuning

■ **Autotuning Operation**

Use the following procedure to autotune the motor constants, i.e., set them automatically.

Step	Key Sequence	Digital Operator Display	Remarks
		YD3 000N Main Menu Programming	Displays programming mode
1		YD3 000N Main Menu Auto−Tuning	Displays autotuning mode
2		Rated Voltage 400.0 VAC	Displays the rated voltage.*1, *2
3		Rated Current 1.90 A	Displays the rated current.*1
4		Rated Frequency 60.0 HZ	Displays the rated frequency. *1, *2
5		Rated Speed 1750 RPM	Displays the rated speed.*1
6		Number of Poles 4	Displays the number of poles.*1
7		Select Motor ½ 1	Displays the motor selection. (Leave set at "1" for motor 1 (the nor mallyused motor constants).)
8		|/ Tuning Ready ? |/ /| Press RUN key /|	Displays a confirmation prompt for the start of the autotuning function. (The lower line will blink.)
9		|/ Tune Proceeding |/ /| □HZ □□□A /|	Starts the autotuning function. (The upper line will blink.)
		Tune Successful	
10		Main Menu Operation	

＊ 1 When the values displayed and the motor constants differ, set each value seperately.

＊ 2 There are differences between simple and advanced settings. Refer to the table below.

Operator Display	Simple Setting (Motor nameplate)	Advanced Setting *
Rated Voltage	Motor rated voltage	No-load voltage at rated revolultions
Rated Frequency	Motor rated frequency	No-load frequency at rated revolutions

＊ The rated voltage for the vector control motor may be 10% to 20% lower than general-purpose motors. Always check the voltage on the motor nameplate or in the test reports.

Note Disconnect the load (machine, device) trom the motor before autotunig
The motor may turn, possibly resulting in injury or damage to equipment. Also motor constants cannot be correctly set with the motor attaced to a load

The following example procedure changes the motor rated current to 1.60 A.

Step	Key Sequence	Digital Operator Display	Remarks
		Rated Current 1.90 A	Displays the rated current.
1	DATA ENTER	Rated Current 001.90 A	When changing the set values, press the DATA/ENTER Key and the digit to change will blink.
2	RESET 按3次	Rated Current 001.90 A	Select the digit to be changed.
3	按3次	Rated Current 001.60 A	Set to 001.60 A.
4	DATA ENTER	Entry Accepted	Press the DATA/ENTER Key to overwrite the set values. "Entry Accepted" will be displayed for approximately 0.5 seconds.
		Rated Current 1.60 A	Returns to the rated current display.

- When autotuning has been executed correctly, the constants (E1-04 to E2-09) will be automatically
- written. Use the following troubleshooting procedure if a fault occurs during autotuning.

■ Troubleshooting Autotuning Faults

The displays and countermeasures for autotuning faults are shown below in Table 5.1If one of these faults is detected, it will be displayed on the Operator and the motor will coast to a stop. The fault contact and alarm contact outputs will not function. When a fault occurs, " Tune Aborted" will be displayed and the messages shown in the following table will blink.

Table 5.1 Troubleshooting Autotuning Faults

Display Message	Fault	Description	Countermeasure
Data Invalid	Motor data fault	Motor data error for autot uning.	• Check the input data. • Check the Inverter and motor capacities.
Resistance	Line resistance fault	Autotuning was not comp leted within a set time.	• Check the input data. • Check the motor wiring.
No-load Current	No-load current fault		
Saturation-1	Saturated core coef ficient 1 fault		
Saturation-2	Saturated core coef ficient2 fault		
Rated Slip	Rated slip fault		
Accelerate	Acceleration fault	The motor did not accelera te within a set time.	• Increase the acceleration time (C1-01). • Increase the torque limits (L7-01, -02) if these have been decreased. • Disconnect the motor from the machine if it has been connected.
PG Direction	Motor direction fault	There is a contact fault bet ween the Inverter, PG (pha se A and B), and motor (ph ases U, V, and W)	• Check the PG wiring. • Check the motor wiring. • Check the PG direction and constant F1-05.
Moteor Speed	Motor speed fault	The torque reference was too large (100%) during a utotuning.	• Disconnect the motor from the machine if it has been connected. • Increase the acceleration time (C1-01). • Check the input data (particularly the number of PG pulses).
ALARM: Over Load	Tuning overload fault	The torque reference was over 20% during autotuni ng.	Check the input data (particularly the number of PG pulses) if the motor is being autotuned separately.
Tune Aborted Minor Fault:□□□	Minor fault	A minor Inverter fault occu rred.	Check the minor fault indicated in the boxes in the display shown at the left.
V/f Over Setting	V/f setting exce eded	The torque command excee ded 100%, and the no-load current ex- exceeded 70% o f the motor's rated current.	• Check and adjust settings if necessary. • Remove the load from the motor.

- Fault displays can be cleared by pressing the MENU Key.
- All set constants (motor constants) will be initialized if a fault occurs. Reset the constants from the beginning when before starting autotuning again.
  Inverter software Nos. VSG101020 to VSG101026 will display "ALARM: Over Load" when the torque command exceeds 100%.

Switching to V/f Control when Autotuning Is Not Successful

When autotuning has not been executed correctly (i.e., when "Tune Aborted" is displayed), switch the control method to "V/f control" and set the V/f pattern.

1. Change the control method to V/f control without PG.

Step	Key Sequence	Digital Operator Display	Remarks
1	MENU	YD3000N Main Menu Operation	Displaysoperationmode.
2	∧	MainMenu Initialize	Displaysinitializemode.
3	DATA ENTER	SelectLanguage English	PutstheUnitininitializemode.(SelectLanguagedisplay)
4	∧ Press twice.	ControlMethod OpenLoopVector	Thecontrolmethodselection isdisplayed.
5	DATA ENTER	A1-02=2 *** OpenLoopVector	Controlmethodselection(A1-02)is displayed.
6	∨ Press twice.	A1-02=0 V/fControl	SelectsV/fcontrol.
7	DATA ENTER	EntryAccepted	Thesetvaluesareoverwritten.
		ControlMethod V/fControl	Returnstothecontrolmethod selectdisplay.
8	MENU	YD3000N: MainMenu Operation	Returnstotheoperationmode display.

2.Checkthemotornameplateandsetthefollowingthreeitems.

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f	V/f w/ PG	Open-loop Vector	Flux Vector
E1-05	Max.voltage	×	0-510	VAC	400	Q	Q	Q	Q
E1-06	Basefrequency	×	0.0~400.0	Hz	60.0	Q	Q	Q	Q
E2-01	Motorratedcurrent	×	10~200%	A	*	Q	Q	Q	Q

* Thefactory settingforratedcurrent differsaccordingto the Invertercapacity.

Thesettingprocedureforthesethreeconstantsisasfollows:

Step	Key Sequence	Digital Operator Display	Remarks
		YD3000N* MainMenu* Operation	Displaysoperationmode.
1	∧ Press twice.	YD3000N* MainMenu* Programming	Displaysprogrammingmode.
2	DATA ENTER	ReferenceSource Terminal	PutstheUnitinprogrammingmode.
3	∧ Press 14 times.	Max.Voltage E1-05=400.0VAC	Displaysthemaximumvoltage.
4	∧	BaseFrequency E1-06=60.0HZ	Displaysthemaximumvoltagefrequency.
5	∧ Press 5 times.	MotorRatedFLA E2-01=1.90A	Displaystheratedcurrent.
6	MENU	YD3000N*MainMenu * Operation	Returnstotheoperationmodedisplay.

* Whentherearediscrepanciesbetweenthedisplayedvaluesandtherating,seteachvalueindividually.

4.3.6 No-load Operation

Thesectiondescribestrialoperationinwhichthemotorisoperatedfromthe DigitalOperatorwiththemotorintheno-loadstate(withthemotornotconnectedtothemechanicalsystem)

■ **SettingtheFrequencyReference**

Setthefrequencyreferenceonthefrequencyreferencemonitorintheoperationmod

Thefollowingisanoperationexamplewiththefrequencyreferencesetto10Hz.

Step	Key Sequence	Digital Operator Display	Remarks
		YD3000N: MainMenu : Operation	Displays operation mode
1	DATA ENTER	FrequencyRef U1-01=0.00HZ	Puts the Unit in operation mode and displays the frequency reference.
2	LOCAL REMOTE	FrequencyRef U1-01=0.00HZ	SwitchesoperationtotheDigitalOperator.(SEQ,REFandLEDindicatorsturnOFF.)
3	DATA ENTER	FrequencyRef 000.00HZ	Setsthefrequencyreference.
4	RESET	FrequencyRef 000.00HZ	Thetensdigitblinks.
5	∧	FrequencyRef 000.00HZ	Setto010.00Hz.
	DATA ENTER	EntryAccepted	Thesetvaluesareoverwritten.
		FrequencyRef 010.00HZ	Returnstothefrequencyreference display.

■ **Operation using the Digital Operator**

- Press the FWD/REV Key.The motor will rotate in the reverse direction.
- Press the Stop Key.The motor will stop.(The RUN Key in dicator will keep blinking until the motor stops.)
- The frequency reference can be changed,even during operation.When this is done,the frequency reference is changed as soon as the DATA/ENTER Key is pressed to input the setvalues.
- If the Jog Key is pressed when the Inverter is stopped,it will rotatebythejogfrequency(Factorysetting:6.0Hz)only while the Key is being pressed.

■ **Checking the Operating Status**

- Afterchangingthefrequencyreferenceortherotationdirection,checkthatthereisnooscillationor abnormalsoundfromthemotor.
- Check that no faults have occurred in the Inverte rduring operation.

4.3.7 Loaded Operation

After checking the operation with the motor in no-load status as described in 4.3.6,connect the load me- chanical system and perform trial operation with an actual load.

■ **Connecting the Load System**

- Afterv confirming that the motor has stopped completely,connect the mechanical system.
- Be sure totighten all the screws when securing the motor shaft to the mechanical system.

■ **OperationusingtheDigitalOperator**

- UsetheDigitalOperatorinthesamewayasinno-loadoperation.
- If fault occurs during operation,make sure the STOP Key on the Digital Operator is easily accessible.
- At first,set the frequency reference to a low speed of one tenth the normal operating speed.

■ **CheckingOperatingStatus**

- Having checked that the operating direction is correct and that the machine is operating smoothly at slow speed,increase the frequency reference.
- After changing the frequency reference or the rotation direction,check that there is no oscillation or abnormal sound from the motor.Check the monitor display to ensure that theU1-03(outputcurrent) is not excessive.

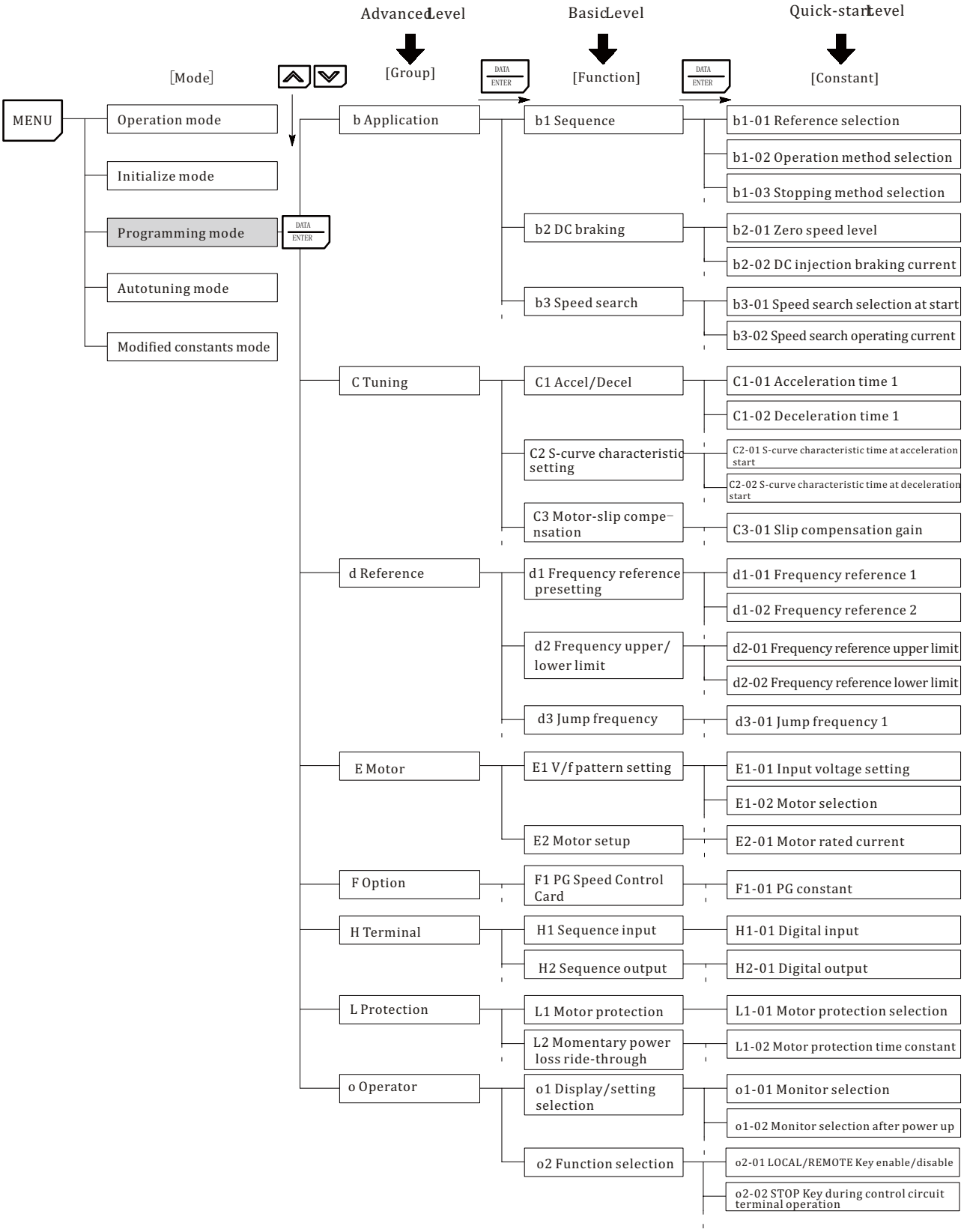
■ User Constant Descriptions

Constant Number	Name / Display	Description	Setting Range	Factory Setting	Change during Operation	Control Methods: V/f	V/f with PG	Open Loop Vector	Flux Vector	Page
A1-00	Language selection for digital operator display / Select Language	Used to select the language displayed on the Digital Operator 0: English 1: Chinese	0, 1	1	○	Q	Q	Q	Q	38

- Constant Number: The constant number.
- Name: The constant name.
- Display: The constant name displayed on the Digital Operator.
- Description: Details of the constant function or setting value.
- Setting Range: The constant setting range.
- Factory Setting: The factory setting value (each control method has its own factory setting. Therefore the factory setting changes when the control method is changed.)

→See page 8 - 45 for factory settings by control method.

- Change during Operation: Indicates whether or not the constant can be changed while in the Inverter is in operation.
  - ○…Changes possible during operation.
  - ×…Changes not possible during operation.
- Control Method: Indicates which control methods and which access levels can be set and referenced.
  - Q… Items which can be set and referenced on all access levels; Quick-Start, Basic, and Advanced.
  - B… Items which can be set and referenced in Advanced and Basic.
  - A… Items which can be set and referenced in Advanced only.
  - ×… Items which cannot be set or referenced in that control method.
- Page: Reference page for more detailed information on the constant.


Advanced Level
Basic Level
Quick-start Level
[Mode]
[Group]
[Function]
[Constant]
DATA ENTER
MENU
Operation mode
Initialize mode
Programming mode
Autotuning mode
Modified constants mode
b Application
b1 Sequence
b1-01 Reference selection
b1-02 Operation method selection
b1-03 Stopping method selection
b2 DC braking
b2-01 Zero speed level
b2-02 DC injection braking current
b3 Speed search
b3-01 Speed search selection at start
b3-02 Speed search operating current
C Tuning
C1 Accel/Decel
C1-01 Acceleration time 1
C1-02 Deceleration time 1
C2 S-curve characteristic setting
C2-01 S-curve characteristic time at acceleration start
C2-02 S-curve characteristic time at deceleration start
C3 Motor-slip compensation
C3-01 Slip compensation gain
d Reference
d1 Frequency reference presetting
d1-01 Frequency reference 1
d1-02 Frequency reference 2
d2 Frequency upper/lower limit
d2-01 Frequency reference upper limit
d2-02 Frequency reference lower limit
d3 Jump frequency
d3-01 Jump frequency 1
E Motor
E1 V/f pattern setting
E1-01 Input voltage setting
E1-02 Motor selection
E2 Motor setup
E2-01 Motor rated current
F Option
F1 PG Speed Control Card
F1-01 PG constant
H Terminal
H1 Sequence input
H1-01 Digital input
H2 Sequence output
H2-01 Digital output
L Protection
L1 Motor protection
L1-01 Motor protection selection
L2 Momentary power loss ride-through
L1-02 Motor protection time constant
o Operator
o1 Display/setting selection
o1-01 Monitor selection
o1-02 Monitor selection after power up
o2 Function selection
o2-01 LOCAL/REMOTE Key enable/disable
o2-02 STOP Key during control circuit terminal operation

5. 1Initialize Mode Constants

A1-00 (Select Language) 0 Q Q Q Q

SettingRange

English [0]
Chinese ★ [1]

Function

Used to select the language displayed on the Digital Operator

Description of choice

Use constant A1-00 to select the language displayed by the Inverter. A value of 0 sets English and a value of 1 sets Japanese.This user constant is not returned to the factory setting when constants are initialized. It must be manually reset to the factory setting.

A1-01 (Access Level) 0 Q Q Q Q

SettingRange

Monitoring only (Displays only Operation mode and Initialize mode) [0]
Used to select user constant [1]
Quick-Start : Q ★ [2]
Basic : B [3]
Basic : A [4]

Function

Used to set the constant access level (set/read.

Description of choice

Use constant A1-01 to select the user constant access level. This level determines which user constantscan be changed and displayed. The user constants that can be displayed and changed also depend upon the control method being used.

A1-02(User Param 1to 32) X Q Q Q Q

SettingRange

V/f control without pulse generator ★ [0]
V/f control with PG feedback [1]
Open-loop vector control [2]
Flux vector control [3]

Function

Used to select the control method for the Inverter

Description of choice

Use constant select one of the four control methods. This user constant is not returned to the factory setting when constants are initialized. It must be manuallyreset to the factory setting.

A1-03 (Init Constants)X Q Q Q Q

SettingRange

No initializing ★ [0]
Initializes using the User constants [1110]
Initializes using a two-wiresequence. (Initializes to thefactory setting.) [2220]
Initializes using a three-wire sequence [3330]

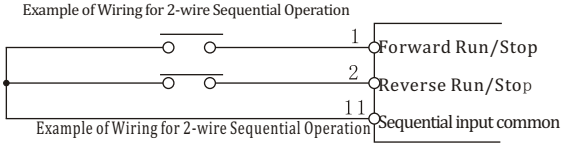
Function

Used to initialize the constants using the specified method.

Description of choice

This function initializes the user constants to values that have been recorded as user settings.To record the user settings, change the user constants to the desired values and then set user constant o2-03(User constant initial value) to 1. Once user settings are recorded, the o2-03 value will be automaticallyreset to 0. (The 1110 function will be disabled when user constant o2-03 is set to 0.)

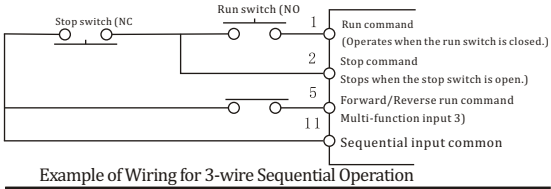
Example of Wiring for 2-wire Sequential Operation



Example of Wiring for 2-wire Sequential Operation

Example of Wiring for 3-wire Sequential Operation

The default settings of the multi-function inputs are different from the default settings of the 2-wire sequence



Example of Wiring for 3-wire Sequential Operation

A1-04 (Enter Password) X Q Q Q Q

SettingRange

0～9999 ★ [0]

Function

Password input when a password has been set in A1-05. This function write-protects some constants of the Initialize mode.

A1-05 (Select Password) X Q Q Q Q

SettingRange

0～9999 ★ [0]

Function

Used to set a four digit number as the password.

Description of choice

Use constants A1-04 and A1-05 to write-protect the initialize-mode user constants.User constants A1-01 through A1-03 and A2-01 through A2-32 can be displayed but not changed ifthe contents of A1-04 and A1-05 are not the same.To write-protec t the initialize-mode user constants, set the password in A1-05 after inputting thedesiredvalues in A1-01 through A1-03 and A2-01 through A2-32. User constant A1-05 can be displayedby displaying A1-04 and pressing the Menu Key while pressing the Reset Key. (A1-05 can't be displayed with the usual Key sequences.)It will be possible to change the i nitialize-mode user constants again when the same password is writtento A1-04 and A1-05.

Refer to the operation of an example page

◀EXAMPL▶ **Initializing for 2-wire Sequential Operation**

Usethefollowingproceduretoinitializeuserconstantstothefactorysettings.

Step	Key Sequence	Digital Operator Display	Remarks
1	MENU	* MainMenu * Operation	
2	△	* MainMenu * Initialize	
3	READ / WRITE	SelectLanguage English	
4	△ Press 3 times	InitParameters NoInitialize	
5	READ / WRITE	A1 03=0*** NoInitialize	
6	△	A1 03=2220 2-wireInitial	
7	READ / WRITE	EntryAccepted	Writes-in the new setting
		InitParameters NoInitialize	Aftera few seconds,the Operatordis-play is as shown on the left.

The initialization has been completed for a 2-wirese quence

◀EXAMPL▶ **Setting the Password to 1000**

Usethefollowingproceduretosetthepasswordto1000

Step	Key Sequence	Digital Operator Display	Remarks
1	MENU	YD3 000N:* MainMenu * Operation	
2	△	YD3 000N* MainMenu * Initialize	
3	READ / WRITE	SelectLanguage English	
4	△ Press 4 times.	EnterPassword A1 04=0	
5	▷ RESET Hold RESET	EnterPassword A1 04=0	
	MENU	SelectPassword A1 05=0	
6	And press MENU READ / WRITE	SelectPassword 0000	The first digit will blink.The blinking digit can be changed.
7	△	SelectPassword 0000	The value of the digit will increment each time the Increment Key is pressed and then stop at9.Press the Decrement Key to decrease the value.
8	READ / WRITE	EntryAccepted	Writes-in the new setting
		SelectPassword A1 05=1000	
9	ESC	EnterPassword A1 04=0	After a few seconds,the Operator dis-play is as shown on the left

The password has been set to 1000.

To enable changing user constants , set the same password in A1-05=0.

A2-01toA2-32 Setting User Constants X A A A A
(User Param1 to 32)

SettingRange

b1-01~o1-01 ★ —

Function

user program access level.Parameters can be set to view the number (maximum 32)

Description of choice

User constants A2-01 through A2-32 specify the constants that can be displayed and changed when the access level (A1-01) is set to 1 (user programs)

5.2 Trial Operation Procedures

5. 2. 1Run Mode b1

b1-01 (Reference selection) 0 Q Q Q Q

SettingRange

Digital Operator		[0]
Control circuit terminals (analog inputs)	★	[1]
MEMOBUS transmission (using SI-K2)		[2]
Optional Card		[3]
MEMOBUS transmission (for CP-717)		[4]

Function

Constant b1-01 is used to select the reference source

Description of choice

The frequency reference is input from the control circuit terminals (external terminals), so set b1-01 to 1.

b1-02 (Run Source) X Q Q Q Q

SettingRange

Digital Operator		[0]
Control circuit terminals (analog inputs)	★	[1]
MEMOBUS transmission (using SI-K2)		[2]
Optional Card		[3]
MEMOBUS transmission (for CP-717)		[4]

Function

Run Source and Sequence Input Responsiveness

Description of choice

Constant b1-02 is used to select the source of the run command.When a control circuit terminal (external terminal) is set, the Unit operates with 2-wire forward run/stop and reverse run/stop control. (When the Unit has been initialized for a 3-wire control or a multifunctioninput is set to 0 (3-wire sequence), the Unit operates with 3-wire run, stop and forward/reverse

b1-03 (Stopping Method) X Q Q Q Q

SettingRange

Deceleration to stop	★	[0]
Coast to stop		[1]
DC braking stop: Stops faster than coast to stop, without regenerative operation.		[2]
Coast to stop with timer: Run commands are disregarded during deceleration time.		[3]

Function

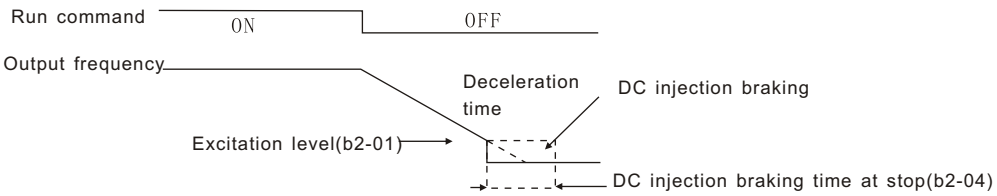
Stopping method selection

Description of choice

Set the stopping method used when a stop command is input.
Only settings 0 and 1 can be used with flux vector control

●The following diagrams show the operation of each stopping method.

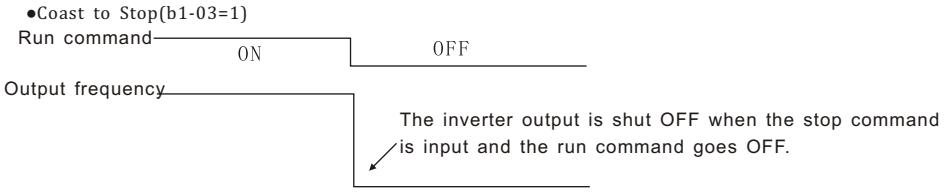
●Deceleration to Stop(b1-03=0)



Decelerates to a stop at a rate set with the selected deceleration time

Deceleration to Stop

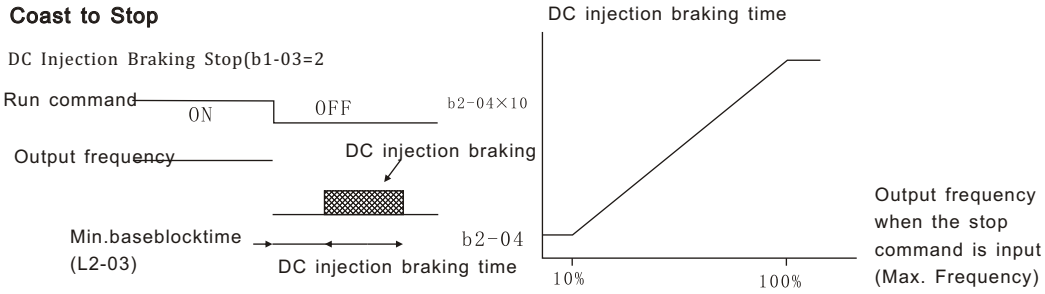
●Coast to Stop(b1-03=1)



After the stopcommand is input,run commands are disregarded until the minimum baseblock time(L2-03)has elapsed.

Coast to Stop

DC Injection Braking Stop(b1-03=2

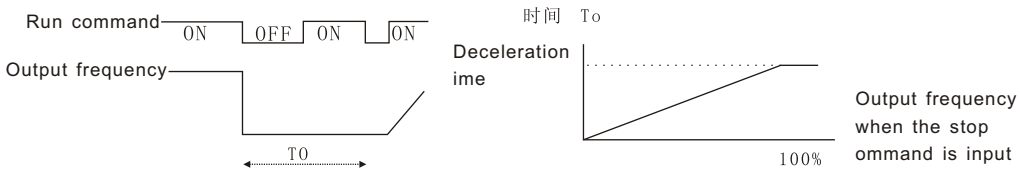


After the stop command is input and the minimum baseblock ime(L2-03) has elapsed,DC injection braking is applied and the motor stopped.
The DC injection braking time depends upon the output frequency when the stop command isinput and the“DC injection braking time at stop”setting in b2-04,as shown in Figure6.6.

DC InjectionBraking Stop

Lengthen the minimum baseblocktime(L2-03)when an overcurrent (OC) occurs during stopping.When the power to an induction motor is turned OFF, the counter-electromotive force generated by the residualmagnetic field in the motor can cause an ove rcurrent to be etected when DC injection braking is applied.

Coast to Stop with Timer(b1-03=3)



After the stop command is input,run commands are disregarded until the timeT has elapsed.The time to depends upon the output frequency when the stopcommand is input and the deceleration time.

b1-04 (Reverse Oper) X B B B B

SettingRange

Allows reverse operation. ★ [0]
Prohibits reverse operation [1]

Function

Prohibition of reverse operation

Description of choice

Set this constant to "1" to disable reverse operation when necessary.

b1-05(Zero-Speed Oper)X X X X A

SettingRange

Operate according to the frequency reference. (E1-09 is invalid.) [0]★
Interrupt the output. (Coast when the frequency reference is below E1-09.) [1]
Operate at E1-09 frequency. (Output the frequency set in E1-09.) [2]
Zero-speed operation (Zero reference value when the frequency reference is below E1-09.) [3]

Function

Set the minimum output frequency according to the requirements of the application

Description of choice

Set the operation method used when the frequency reference is below the minimum output frequency.

b1-06(Cntl Input Scans) X X X X A

SettingRange

Two scans every 2 ms (Use when connecting transistor outputs.) [0]
Twd scans every 5 ms (Use when connecting contact outputs or switches.) ★[1]

Function

Set the responsiveness of the control inputs (forward/reverse run and multi-function inputs)

Description of choice

Set the responsiveness of the control inputs

(forward/reverse run and multi-function inputs)

b1-07 (LOC/REM RUN Sel) X A A A A

SettingRange

o operation even if RUN signal is ON after switching to remote mode. ★ [0]
Operate according to the RUN signal after switching to remote mode. [1]

Function

Operation selection after switching to remote mode

Description of choice

Set the interlock operation to be used after switching from local mode (operation from Digital Operator)to remote mode (operation according to control circuit terminal).

b1-08 (RUN CMD at PRG) X A A A A

SettingRange

Cannot operate ★ [0]
Can operate.Operator selectsrun command (whenB1-02=0). [1]

Function

Used to set the Operation mode in program mode.

5. 2. 2DC Injection Braking:b

b2-01(DCInj Start Freq)X B B B B

SettingRange

0.0 to 10.0 ★ [0.5]

Function

Zero speed level(DC injection braking starting frequency)

Description of choice

The DC injection braking function decelerates by applying a DC current to the motor. This happens in the following two cases

• DC Injection Braking Time at Start:Effective for temporarily stopping and then restarting, without regenerative processing, a motorcoasting by inertia.

• DC Injection Braking Time at Stop:

Used to prevent coasting by inertia when the motor is not completely stopped by normal decelerationwhen there is a large load. The stopping time can be shortened by lengthening theDCinjection braking time or increasing the DC injection braking current.

b2-02 (Dcinj Current) X B B B X

SettingRange

0~100 ★ [50]

Function

DC injection braking current

Description of choice

For the DC injection braking current (b2-02), set the value for the current that is output at the time of DC injection braking. DC injection braking current is set as a percentage of Inverter rated output current with the Inverter rated output current taken as 100%.

b2-03 (DCinj Time @Start)X B B B B

SettingRange

0~10.00 ★ [0.0]

Function

Used to set the time to perform DC injection braking (initial excitation for flux vector control) at tart in units of 1 second.

Description of choice

When the DC injection command (initial excitation command) for multi-function input terminals isused at the same time, open the terminal input, and perform DC injection braking only for the periodof time set under b2-03.

b2-04(DCInj Time @Stop)X B B B B

SettingRange

0.00~10.00 ★ [0.50]

Function

Used to set the time to perform DC injection braking (initial excitation for flux vector control) at tart in units of 1 second.

Description of choice

Used to prevent coasting after the stop command is input.When the set value is 0.00, DC injection braking at stop is not performed.

b2-08(Fidld Comp @Start)X - - A A

SettingRange

0~500 ★ [0]

Function

Used to set the magnetic flux compensation in % units, with the no-load current as 100%

Description of choice

When b2-08 is 100%, it indicates the motor no-load current (notor magnetic flux current).

If b2-08 is set at 100% or greater, a stronger current can be supplied when startingDCinjection brakingtime at start (initial excitation), and the motor's internal magnetic flux startup can be speeded up. Thestartup time can be reduced by approximately half when the b2-08 is set to 200%.
The magnetic flux startup is slower if b2-08 is less than 100%. (Do not normally set b2-08 to less than100%. However, the operation will be the same as b2-08=100% when b2-08=0%, and the startup willbe at the set DC injection braking current (b2-02).If the magnetic flux compensation volume (b2-08) is set to a large value, there may be greater noisegenerated from the motor during DC injection braking time at start.
The electrical time constant when the motor's magnetic flux is started (secondary circuit time constant)can be calculated using the motor constant E2 setting and the following formula :Secondary circuit time constant T2 = [(E2-012-E2-032)½ / (2π x E2-02 x E2-03)] (sec)Do not use this function when slow commencement of braking due to DC injection braking time atstart (initial excitation) is becoming a problem. Use the separate DC braking command (setting: 60)for multi-function contact input , and start the motor magnetic flux beforehand while stopping the moto

5. 2. 3Speed Search: b3

b3-01 (Spdsrch at Start) X A A A A

SettingRange

Speed search disabled		[0]
Speed search enabled	★	[1]

Function

Speed search selection at start

Description of choice

Speed search selection
Set "1" to use the speed search function. A speed search is performed each time the run command isinput.To use speed search freely in control methods without PG, i.e., V/f control and open-loop vector control,set the multi-function contact input selection (H1-01 to H1-06) to 61 or 62 (external search command).

b3-02 (SpdSrch Current) X A X A X

SettingRange

0~200 ★ [100]

Function

Sets the speed search operationcurrent as a percentage of the Inverter rated current.

Description of choice

The factory setting for V/f control is 150%

Not usually necessary to set.When restarting is not possible

with the set value, reduce the value.

b3-03 (SpdSrch Dec Time) X A X A X

SettingRange

0.1~10.0 ★ [2.0]

Function

Set the time for decelerationfrom the maximum output frequency to 0 Hz.speed search in 1-second units

Description of choice

When the speed search and DC injection braking are set, set the minimum base block time (L2-03). Forthe minimum baseblock time, set the time to wait for the motor's residual voltage to dissipate. If an overcurrent is detected when starting a speed search or DC injection braking, raise the setting to prevent a fault from occurring.

5. 2. 4Timer Function: b4

b4-01 (Delay-ON Timer) X A A A A

SettingRange

0.0~300.0 ★ [0.0]

Function

Sets the timer function output ON-delay time (dead band) for the timer function input, in 1-second units.

Description of choice

The timer functions are enabled when the timer function input (setting: 18) and the timer function output(setting: 12) are set for the multi-function input and multi-function output respectively. These inputs and outputs serve as general-purpose I/O. Chattering of sensors, switches, and so on, canbe prevented by setting a delay time. (timer function ON-delay time)

b4-02 (Delay-OFF Timer) X A A A A

SettingRange

0.0~300.0 ★ [0.0]

Function

Sets the timer function output OFF-delay time (dead band) for the timer function input, in 1-second units.

Description of choice

The timer functions are enabled when the timer function input (setting: 18) and the timer function output(setting: 12) are set for the multi-function input and multi-function output respectively.When the timer function input OFF time is longer than the value set for b4-02 (timer function OFFdelaytime), the timer function output turns OFF. An operation example of the timer function is shown

5. 2. 5PID Control: b5

b5-01 (PID Mode) X A A A A

SettingRange

PID control disabled	★	[0]
PID control enabled, deviation signal is subject to derivative control.		[1]
PID control enabled, feedback signal is subject to derivative control.		[2]
PID control enabled (frequency command + PID control, deviation is subject to D control.)		[3]
PID control enabled (frequency command + PID control, feedback is subject to D control.)		[4]

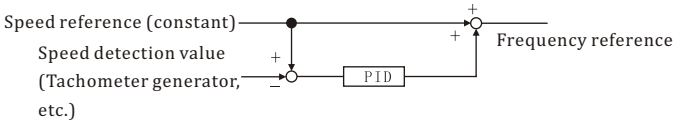
Function

PID control mode selection

Description of choice

If setting the target value input as b1-01=0 (Digital Operator), set the o1-03 to "1" (% unit) andinput a percentage value for the target value. (When the speed reference is changed, 100% becomesthe maximum frequency reference.)
The feedback value is input from a multi-function analog input terminal or frequency referencecurrent) terminal. Set PID feedback (setting: B) for either the constant H3-05 (multi-function analoginput, terminal 16), or constant H3-09 (multi-function analog input, terminal 14) functionselection . (See Table 7.11.) Adjust the amount of feedback by setting the gain and bias of the analoginputs that are used.

Figure 7.25 shows a speed control application example for settings 3 and 4 (for SPEC: F).



Application Example of Settings 3 and 4

PID Control Applications

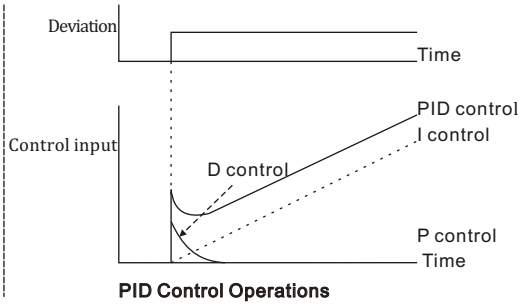
shows examples of PID control applications using the Inverter

PID Control Applications

Application	Control contents	Sensors used(example)
Speed control	Speeds are matched to target values as speed information in a mechanical system. Speed information for another mechanical system is input as target values, and synchronized control is executed by feeding back actual speeds.	Tachogenerator
Pressure control	Pressure information is returned as feedback for stable pressure control.	Pressure sensor
Flow control	Flow information is returned as feedback for accurate flow control.	Flow sensor
Temperature control	Temperature information is returned as feedback to control temperature by turning a fan.	Thermocouple Thermistor

PID Control Operations

In order to distinguish the separate PID control operations (i.e., proportional, integral, and derivative), Figure7.23 shows the changes in the control input (i.e., the output frequency) when the deviation betweenthe target value and the feedback is held constant.



PID Control Operations

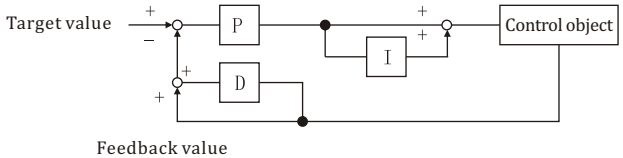
- P Control: Acontrol input proportional to the deviation is output. The deviation cannot be zeroed by P control alone.
- I Control: A control input which is an integral of the deviation is output. This is effective formatching the feedback to the target value. Sudden changes, however, cannot be followed
- D Control: .A control input which is an integral of the deviation is output. Quick response to sudden changes is possible.
- PID Control: Optimum control is achieved by combining the best features of P, I, and D control.

Types of PID Control

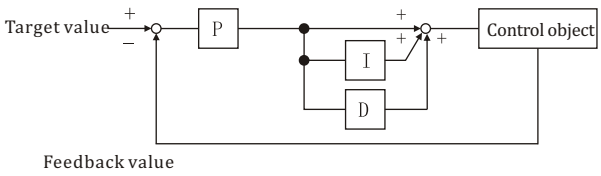
Two types of PID control are possible with the Inverter: Measured-value derivative PID control and basicPID control. The type that is normally used is measured-value derivative PID control.

Measured-value Derivative PID Control:

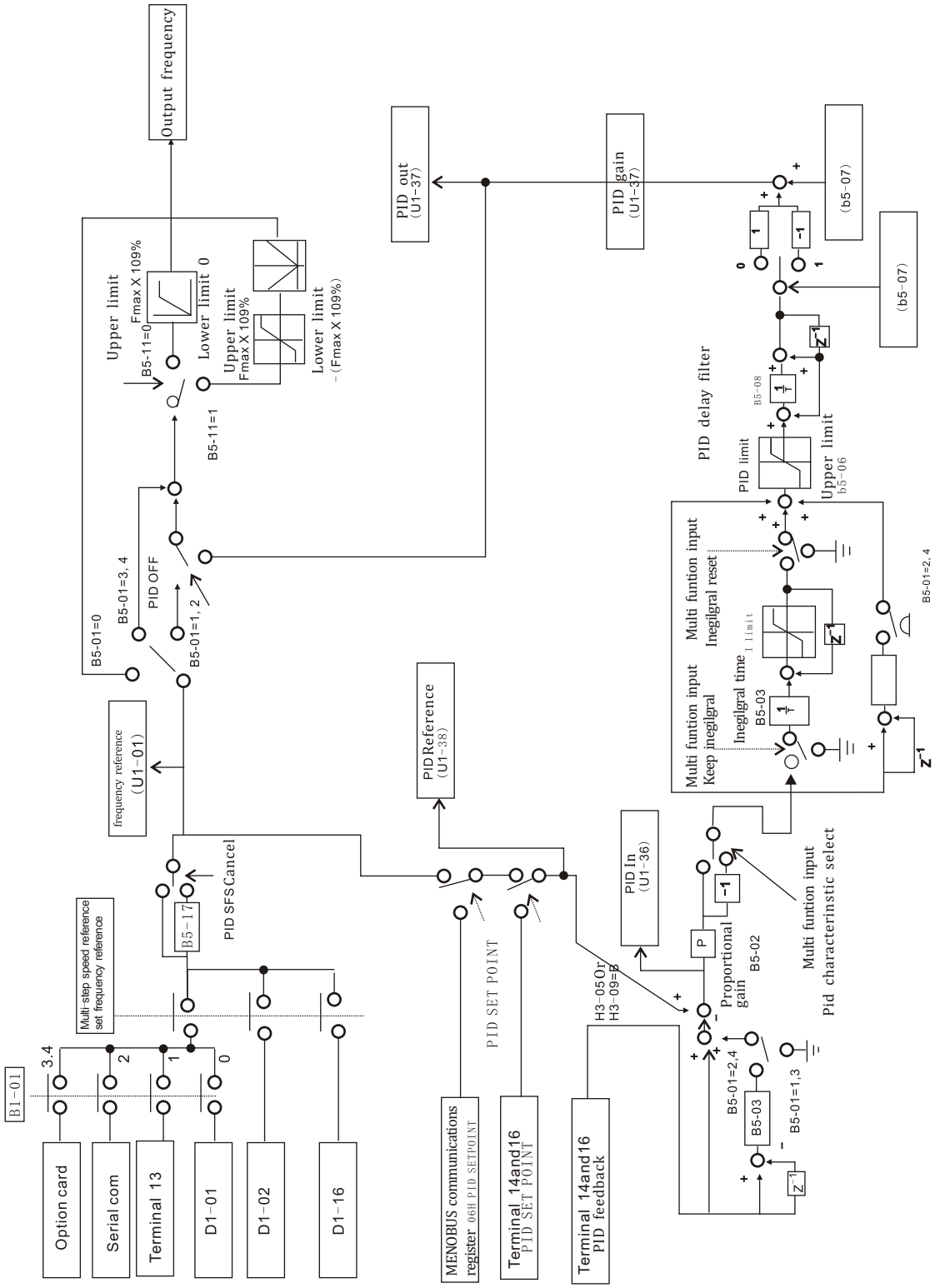
With measured-value derivative PID control, the feedback value is differentiated for PID control. Response is possible with respect to changes both in target values and the control object.



Basic PID Control: This is the basic form of PID control. When the D control response is adjusted to follow changes in the control object, overshooting and undershooting can occurwith changes in the target value.



PID Function



b5-02 (PID Gain) 0 A A A A

SettingRange

0.00~25.00 ★ [1.00]

Function

Sets P-control proportional gain as a percentage

Description of choice

Adjust the responsiveness of the PID control by means Of the proportional gain (P), integral time(I), and derivative time (D).Optimize the responsiveness by adjusting it while operating an actual load (mechanical system).Any control (P, I, or D) that is set to zero (0.0, 0.00) will not operate.

b5-03 (PID I Time) 0 A A A A

SettingRange

0~360.0 ★ [1.0]

Function

Sets I-control integral time in 1-second units.

Adjust the responsiveness of the PID control by means of the proportional gain (P), integral time(I), and Derivative time (D).Optimize the responsiveness By adjusting it while operating an actual load (mechanical system).Any control (P, I, or D) that is set to zero (0.0, 0.00) will not operate.

b5-04 (PID I Limit) 0 A A A A

SettingRange

0.0~100.0 ★ [100.0]

Function

Sets the I-control limit as a percentageof the maximum output centage frequency.

Description of choice

This constant prevents the calculated value of the integral control in the PID control from exceedingthe fixed amount. There is normally no need to change the setting.Reduce the setting if there is a risk of load damage, or of the motor going out of step, by the Inverter's response when the load suddenly changes. If the setting is reduced too much, the target value and the feedback value will not match.

b5-05 (PID D Time) 0 A A A A

SettingRange

0.0~10.0 ★ [0.00]

Function

Sets D-control derivative time in 1-second units.

Description of choice

Adjust the responsiveness of the PID control by means of the proportional gain (P), integral time(I), and derivative time (D). Optimize the responsiveness by adjusting it while operating an actual load (mechanical system).Any control (P, I, or D) that is set to zero (0.0,0.00) will not operate

b5-06 (PID Limit) 0 A A A A

SettingRange

0.0~100.0 ★ [100.0]

Function

Set this constant as a percentage of the maximum output frequency, with the maximum frequency taken as 100%.

Description of choice

Constant b5-06 prevents the frequency reference after PID contrd from exceeding the fixed amount.

b5-07 (PID Offset) 0 A A A A

SettingRange

-100.0~+100.0 ★ [0.0]

Function

Sets the limit after PID-control as a percentage of the maximum outoutput frequency.

Description of choice

If both the target value and the feedback value are set to zero, adjust the Inverter's output frequencyto zero.

b5-08(PID Delay Time) 0 A A A A

SettingRange

0.00~10.0 ★ [0.00]

Function

Sets the time constant for low pass filter for PID-control outputs in1-second units units.

Description of choice

If the viscous friction of the mechanical system is high, or if the rigidity is low, causing the mechanicalsystem to oscillate, increase the setting so that it is higher than the oscillation frequency period.This will decrease the responsiveness, but it will prevent the oscillation.

b5-09(Output Level Sel) X A A A A

SettingRange

PID output has forward characteristics ★ [0]
PID output has reverse characteristics [1]

Function

Select forward/reverse for PID output.

b5-10 (Output Gain) X A A A A

SettingRange

0.0~25.0 ★ [1.0]

Function

Sets output gain

b5-11 (Output Rev Sel) X A A A A

SettingRange

0 limit when PID output is negative. ★ [0]
Reverses when PID output is negative. [1]

Function

PID reverse output selection

Description of choice

0 limit when reverse prohibit is selected using b1-04. When the PID control output is negative, can reverse the output drive. But if to B1-04 (select static reverse) is set to 1, PID output is 19,0 as the limit

b5-12(Fb los Det Sel) X A A A A

SettingRange

No detection of loss of PID feedback. ★ [0]
Detection of loss of PID feedback [1]
Detection of loss of PID feedback. [2]

Description of choice

[0] :No detection of loss of PIDfeedback.

[1] : Detection of loss of PID feedback.Operation continues duringdetection, with the malfunctioningcontact not operating
[2] : Detection of loss of PID feedback.Coasts to stop during detection,and fault contact operates.

b5-13 (FB los DET Lvl) X A A A A

SettingRange

0~100 ★ [0]

Function

Sets the PID feedback loss detection level in % units, with the maximum output frequency at 100%.

b5-14(Fb los Det Time) X A A A A

SettingRange

0.0~25.5 ★ [1.0]

Function

Sets the PID feedback loss detection level in s units.

5. 2. 6Dwell Functions: b6

b5-14 (Dwell Ref@Start) X A A A A

SettingRange

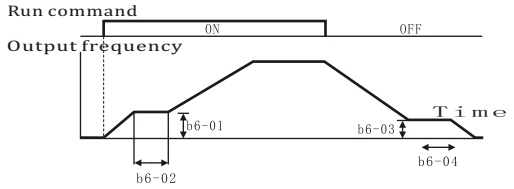
0.0~400.0 ★ [0.0]

Function

Dwell frequency at start

Description of choice

The dwell functions are used to temporarily hold the output frequency when starting or stopping a motorwith a heavy load . This helps to prevent stalling.
The relation between these constants is shown in Figure



Timing Chart for Dwell Functions

b6-02 (Dwell Time@Start) X A A A A

SettingRange

0.0~10.0 ★ [0.0]

Function

DWELL function setting suspension

Description of choice

The relation between these constants is shown in Figur

b6-03(Dwell Ref@Stop) X A A A A

SettingRange

0.0~400.0 ★ [0.0]

Function

DWELL function setting suspension

Description of choice

The relation between these constants is shown in Figur

b6-04(Dwell Time@Stop)X A A A A

SettingRange

0.0~10.0 ★ [0.0]

Function

DWELL function setting suspension

Description of choice

The relation between these constants is shown in Figur

5. 2. 7Droop Control: b7

b7-01 (Droop Gain) 0 X X X A

SettingRange

0.0~100.0 ★ [0.0]

Function

Sets the slip as a percentage of maximum frequency when themaximum output frequency is specified and the rated torque oc- occurs.

Description of choice

Droop-control is not performedwhen the setting is 0.0.

b7-02(Droop Delay Time)0 X X X A

SettingRange

0.03~2.00 ★ [0.05]

Function

Droop control delay time

Description of choice

Droop control responsiveness constantWhen hunting or oscillation occurs,increase the value.

5. 2. 8Energy Saving: b8

b8-01(Energy Save Gain) X A A X X

SettingRange

0~100 ★ [80]

Function

Sets the Inverter output voltagewhen the energy-saving command is input.

Description of choice

when the energy-saving command is input.Set this value as apercentage of the V/f pattern's voltageConstant L2-04 (the voltage recovery time) determines the rate at which the output voltage is changedwhen the energy-saving command is turned ON or OFF.

b8-02 (Energy Save Freq) X A A X X

SettingRange

0.0~400.0 ★ [0.0]

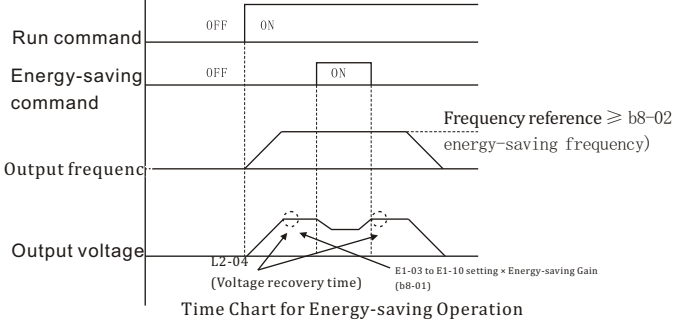
Function

Sets the energy-saving effectiverange minimum frequency in Hz

Description of choice

The energy-saving function isonly enabled when the frequen-frequencyis greater than the energysavingfrequency and the speeds are consistent.

A time chart for energy-saving operation is shown below.



Time Chart for Energy-saving Operation

5. 2. 9Zero Servo: b9

b9-01 (Zero Serve Gain) X X X X A

SettingRange

0~100 ★ [5]

Function

Enabled when the "zero-servocommand" is set for the multifunctioninput. When the zeroservocommand has been inputand the frequency referencedrops below excitation level(b2-01), a position control loopis created and the motor stops.Incre-asing the zero-servo gainin turn increases the strength of thelock. Increasing it by too much will cause oscillation.

b9-02 (Zero Serve Count) X X X X A

SettingRange

0~16383 ★ [10]

Function

Set the allowable position displacement from the zero-servo position to 4 times the pulse rate of the PG (pulse generator, encoder) in use.

Description of choice

Assign the zero servo command (setting 72) to one of the multi-function inputs (H1-01 to H1-06).
The zero-servo status is entered when the frequency (speed) reference falls below the zero-speed level (B2-01).Be sure to leave the run command input ON. If the run command is turned OFF, the output will be interruptedand the zero-servo function will become ineffective.To output the zero-servo status externally, assign the Zero Servo End signal setting 33) to one of themulti-function outputs (H2-01 to H2-03). The setting in b9-02 (Zero-servo CompletionWidth) is enabledwhen one of the multi-function outputs has been set to 33.The Zero Servo End signal remains ON as long as the position is within this range (starting position± Zero-servo Completion Width).For example, when a 600 p/r encoder is being used, the numberof pulses would be 2,400 p/r after multiplyingby four.The Zero Servo End signal will go OFF when the zero servo command is turned OFF.Do not lock the servo for extended periods of time at 100% when using the zero servo function. Extendedperiods of servo lock can be achieved by ensuring that the current during the servolock is 50% or less or by increasing the Inverter capacity.

5. 3 :Self-learning parameters

5. 3. 1Acceleration/Deceleration: C1

C1-01 (Accel Time 1) 0 Q Q Q Q

SettingRange

0. 0~60000. 0 ★ [10. 0]

Function

Sets the acceleration time to acceleratefrom 0 to the maximum celerate output frequency, in 1-second units

C1-02 (Decel Time 1) 0 Q Q Q Q

SettingRange

0. 0~60000. 0 ★ [10.0]

Function

Sets the deceleration time to deceleratefrom the maximum output cele rate frequency to 0, in 1-second units.

C1-03 (Accel Time 2) 0 B B B B

SettingRange

0·0~6000·0 ★ [10.0]

Function

The acceleration time when the multi function input "accel/decel multi-time 1" is set to ON.

C1-04 (Decel Time 2) 0 B B B B

SettingRange

0. 0~6000. 0 ★ [10. 0]

Function

The deceleration time when the multi function input "accel/decel multi-time 2" is set to ON.

C1-05 (Accel Time 3) X A A A A

SettingRange

0. 0~6000. 0 ★ [10. 0]

Function

The deceleration time when the multi function input "accel/decel multi-time 2" is set to ON.

C1-06 (Decel Time3) X A A A A

SettingRange

0. 0~6000. 0 ★ [10. 0]

Function

he deceleration time when the multi function input "accel/decel multi-time 2" is set to ON.

C1-07 (Accel Time 4) X A A A A

SettingRange

0. 0~6000. 0 ★ [10. 0]

Function

The acceleration time when the multi-function input "accel/decel time 1" and "accel/decel time 2"are set to ON.

C1-08 (Decel Time4) X A A A A

SettingRange

0. 0~6000. 0 ★ [10. 0]

Function

The deceleration time when the multi-function input "accel/decel time 1" and "accel/decel time 2"are set to ON.

Description of choice

The setting range for the acceleration/deceleration times depends on the setting in C1-10 (acceleration/deceleration time unit). The table shows the setting range when the factory setting is used for C1-10.If C1-10 is set to "0" (0.01 s) the setting range will be 0.00 to 60
0.00 s.

C1-09 (Fast Stop Time) X B B B B

SettingRange

0. 0~6000. 0 ★ [10. 0]

The deceleration time when the multi-function input "Emergency (fast) stop" is set to ON.)

Description of choice

Sets the deceleration time that will be used when an emergency stop signal is input or a fault is detected.The deceleration time is the time required to go from 100% to 0% of the maximum output frequency.When using an emergency stop input, set a multi-function input (H1-01 through H1-06) to for an emergencystop.

C1-10 (Acc/Dec Units) X A A A A

SettingRange

0.01-second units [0]
0.1-second units ★ [1]

Function

The deceleration time when the multi-function input "Emergency (fast) stop" is set to ON

Description of choice

Set"0"to set more presise acceleration and deceleratio times. (This will redce the setting range)

C1-11(Acc/Dec SW Freq) X A A A A

SettingRange

0.0~400.0 ★ [0.0]

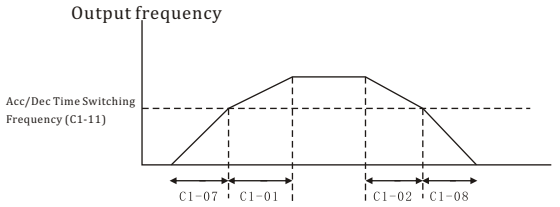
Function

Sets the frequency for automaticacceleration/deceleration switching.
Below set frequency: Accel/deceltime 4
Ab t f A l/d Above set frequency: Accel/decel time 1

Description of choice

When an acceleration/deceleration time switching frequency is set, the acceleration and deceleration times will be changed automatically as the frequency passes the set level.

The multi-function input "accel/decel time 1" or "accel/decel time 2" take priority.



Acceleration/Deceleration Times 1 (C1-01 and C1-02) are used when the output frequency ≥C1-11
Acceleration/Deceleration Times 4 (C1-07 and C1-08) are used when the output frequency < C1-11
Acceleration/Deceleration Time Switching Frequency

5. 3. 2S-curve Acceleration/Deceleration: C2

C2-01(SCrv Acc @ Start) X A A A A

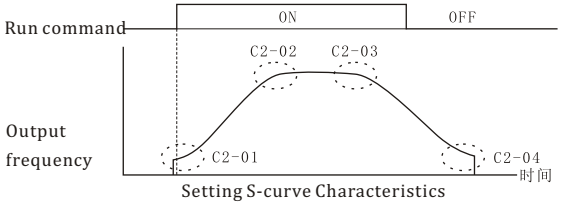
0.0~2.50 ★ [0.20]

Function

All sections of the S-curve characteristictime are set in seconds units.

Description of choice

Using the S-curve characteristic function for acceleration an deceleration can reduce shock to the machinerywhen stopping and starting.With the Inverter, S-curve characteristi times can be set respectively for beginning acceleratio , endingacceleration, beginning deceleration, and ending deceleration.



Setting S-curve Characteristics

Acceleration time =Selected acceleration time + (S-curve at beginning of acceleration + S-curve at end of acceleration) / 2Deceleration time =Selected deceleration time + (S-curve at beginning of deceleration + S-curve at end of deceleration) / 2

C2-02 (SCrv Acc @ End)X A A A A

SettingRange

0.0~2.50 ★ [0.20]

Function

All sections of the S-curve characteristic time are set in seconds units.

C2-03 (SCrv Dec @ Start)X A A A A

SettingRange

0.0~2.50 ★ [0.20]

Function

All sections of the S-curve characteristictime are set in seconds units.

C2-04 (SCrv Dec@ Endt) X A A A A

SettingRange

0.00~2.50 ★ [0.00]

Function

All sections of the S-curve characteristictime are set in seconds units.

5. 3. 3Motor Slip Compensation: C3

C3-01 (Slip Comp Gain)O B X B B

SettingRange

0.0~2.5 ★ [0.0]

Function

The motor slip compensation function calculates the motor torque according to the output current, andsets gain to compensate for output frequency.This function is used to improve speed accuracy when operating with a load. It is mainly effective with V/f control (without PG).

Description of choice

When the control method is switched, the factory setting changes as follows:V/f control: 0.0; V/f with PG: 1.0; open-loop vector 0; flux vector: 1.0• When "1.0" is set, this function compensates for the rated slip that has been set, by the rated torqueoutput. • With flux vector control, this becomes the gain to compensate for slip caused by motor temperaturevariation.This function is used to improve speed accuracy when operating with a load. It is mainly effective with V/f control Correctly set the motor rated slip (constant E2-02) and the motor no-load current (constant E2-03).• The motor rated slip can be calculated by means of the following quation, using the numbers thatare shown on the motor nameplate.Motor rated slip =Motor rated frequency (Hz) – rated speed (r/min) x motor (No. of poles) / 120• Set the values at the rated voltage and rated frequency for the motor no-load current.With vectorcontrol, the motor rated slip is automatically set by autotuning.Set the slip compensation gain (constant C3-01 to "1.0." (If it is set to "0.0 ," slip compensation willbe disabled.)

C3-02(Slip Comp Time)X A X A X

SettingRange

0~10000 ★[2000]

Function

Slip compensation primary delay time is set in ms units.

Description of choice

When responsiveness is low, decreasethe set value.
When speed is not stabilized, increasethe set value.

C3-03 (Slip Comp Limit) X A X A X

SettingRange

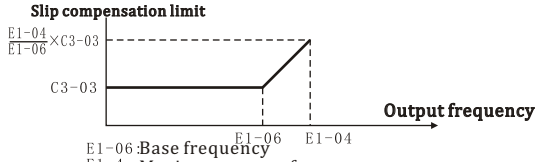
0~250 ★ [200]

Function

Constant C3-03 sets the slip compensation limit as a percentage of motor rated slip (E2-02), with the motor rated slip taken as 100%.

Description of choice

If the speed is lower than the target value and does not change even when the slip compensation gainis adjusted, it is possible that the slip compensation limit has been reached. Raise the limit and thencheck again. Make sure, however, that the value of the sum of the reference frequency and the slip compensationlimit does not exceed the speed capacity of the machinery.



E1-06:Base frequency
E1-4: Maximum output frequency

C3-04 (Slip Comp Regen) X A X A X

SettingRange

Slip compensation disabled during regeneration ★ [0]
Slip compensation enabled during regeneration [1]

Function

Slip compensation selection during regeneration

Description of choice

The amount of regeneration is momentarily increased when this function is used, so some control option(e.g., Braking resistor, Braking Resistor Unit, Braking Unit) may be required.

C3-05 (Flux Select) X A X A X

SettingRange

Flux is calculated based on theoutput frequency after compensation pensation. ★ [0]
Flux is calculated based on the output frequency before compensation. [1]

Function

Flux calculation method

Description of choice

[0] : Flux is calculated based on theoutput frequency after compensation pensation.
[1] : Flux is calculated based on the output frequency before compensation.

C3-06 (Output V Limit) X X X A

SettingRange

Invalid ★ [0]
Effective [1]

Function

Limited output voltage operation

Description of choice

If the limited output voltage operation is disabled and output voltage becomes saturated, the outputcurrent does not chang −e. However, torque control precision is no longer possible. Enable limited output voltage operation if precise torque control is required.
If the limited output voltage operation is enabled, the magneti −c flux current of the motor is automaticallycontrolled, and the output voltage command itself is limited, which maintains pr −ecise torque control.Check the Inverter current margins as the output current will be maximum 10% higher (with a rated load) than when limited output voltage operation is disabled

C3-06 does not need to be changed if the Unit is used only at medium or low speeds, orhen the power supply voltage is10% or more higher than the rated voltage for the motor, when torque control precision in the high-speed region is not required.When the power supply voltage is too low for the rated motor voltage, precise torque controlwill not be maintained even if limited output voltage operation is enabled.

C4-01 (Torq Comp Gain) 0 B B B X

SettingRange

0.00~2.50 ★ [1.00]

Function

Sets torque compensation gain as a ratio.

Description of choice

This constant can be changed during operation, but normally no adjustments are required. Make adjustmentsin the following cases under the V/f control mode:
If the wiring distance between the Inverter and the motor is long, raise the
If the motor capacity is less than the Inverter capacity (the maximum application motor capacity),raise the setting.
If the motor generates excessive oscillation, lower the setting.
Adjust the output current range atminimum speed rotation so that it does not exceed the Inverter ratedoutput current. Do not alter the torquecompensationgain when in open-loop vectorcontrol mode.

C4-02 (Torq Comp Time) X A A A X

SettingRange

0~10000 ★ [200]

Function

The torque compensation delaytime is set in ms units.

Description of choice

* When the control method is switched, the factory setting changes as follows:V/f control, V/f with PG : 200 [1000 ms for inverters of 30 kW or larger (200 V class), orinverters of 55 kW or larger (400 V class)]; open-loop vector : 20D The torque compensation time constant does not normally need to be adjusted, but make adjustmentsin the following cases:
• If the motor generates excessive oscillation, raise the setting.
• If motor responsiveness is low, lower the setting.

C4-03 (F TorqCmp@Start) X X X A X

SettingRange

0.00~200.00 ★ [0.0]

Function

Sets start torque compensationwith the motor's rated torque at, 100%

C4-04 (R TorqCmp@Start) X X X A X

SettingRange

-200.0~0.0 ★ [0.0]

Function

Sets start torque compensationwith the motor's rated torque as100%

C4-05 (TorqCmp Delay T) X X X A X

SettingRange

0~200 ★ [10]

Function

Sets the start torque constant in ms units.

Description of choice

When this function is used, set the starting torque value to the friction load value for ordinary machinery,and to the load for cranes and other lifting devices. Friction load: Set the friction load for both C4-03 and C4-04.Lifting devices: Set the load for the motor side only (hoist). Do not use this function for lifting deviceswith counterweights as a shock will be generated if there is a regenerative load.D Compensation canbe set only for the motoring side, for both the forward and reverse directions. It cannotbe set for the regenerative side.

Starting torque compensation is disabled when switching between forward and reverse after conducting a speed search.Starting torque compensation is always disabled when the second motor is used.
Set the constant for starting torque compensation (C4-05) to a large value if a shock is generated duringstartup. Alternatively, use DC injection braking (b2-03) at startup or the DC braking command for multifunctioncontact input (setting: 60), and start motor magnetic flux before startup.

5. 3. 5Speed Control (ASR): C5

C5-01(Asr P Gain 1) 0 X B X B

SettingRange

0. 00~300. 00 ★ [20. 00]

Function

Sets the proportional gain of the speed loop (ASR)

Description of choice

Increase the setting can improve responsiveness, usually a larger load is to increase the set value, but will occur when the shock is too large

C5-02 (Asr I Gain 1) 0 X B X B

SettingRange

0. 000~10. 000 ★ [0. 500]

Function

Sets the integral time of the speed loop(ASR) in 1 second units

Description of choice

When using "V/f control with PG feedback," set the gain at the minimum output frequency and maximumoutput frequency.
Set the proportional gain (C5-01) and the integral time (C5-02) of the speed control (ASR)

C5-03 (ASR P Gain 2) 0 X B X B

SettingRange

0. 00~300. 00 ★ [20. 00]

Function

Usually setting is not necessary.Set to change the rotational speed gain.

C5-04(ASR I Time 2)0 X B X B

SettingRange

0. 000~10. 000 ★ [0. 500]

Function

Usually setting is not necessary.Set to change the rotational speed gain.

Description of choice

Set ASR proportional gain 2 (C5-03) and ASR integral time 2 (C5-04) for the minimum output frequency.

C5-05 (ASR Limit) X X A X X

SettingRange

0. 0~20. 0 ★ [5. 0]

Function

Sets the upper limit for the compensationfrequency for thespeed control loop(ASR) to a percentage of the maximumoutput frequency.

Description of choice

Since C5-05 can't be changed during operation, stop the Inverter's operation and then decreasethe ASR limit by 0.5 (%).

The ASR limit is the frequency limit for compensation by speed control. Set this frequency limitas a percentage of the maximum output frequency.

C5-06 (ASR Delay Time) X X A X X

SettingRange

0 000~0. 500 ★ [0. 004]

Function

Sets the filter time constant; the time from the speed loop to the torque commandoutput in units of 1-secondmand output, second.

Description of choice

Normally it isn't necessary to make this adjustment. Constant C5-06 can be used when adjusting the gain doesn't remove] motor oscillation, or adjustingthe gain removes oscillation but results in poor responsiv -eness.A high C5-06 setting lowers the responsiveness of the speed control, but makes it difficult for oscillationto occur.

C5-07(ASR Gain SW Freq)X X X X A

SettingRange

0. 0~400. 0 ★ [0. 0]

Function

Sets the frequency for switching betweenProportion Gain 1, 2 and Integral Time 1,2 in Hz units

Description of choice

Set constant C5-07 to the frequency at which to switch to the low-speed ASR proportional gain and integral time.

C5-08(ASR I Limit) X X X X A

SettingRange

0~400 ★ [400]

Function

Set to a small value to prevent any radiC5cal load change. Set to 100% of the max- maximum output frequency.

5. 3. 6Carrier Frequency: C6

C6-01 (Carrier Freq Max)X B B B B

SettingRange

2. 0~5. 0 ★ [7. 0]

Function

Set the carrier frequency upper limit and lower limit in kHz units.

C6-02 (Carrier Freq Max) X A A X X

SettingRange

0. 4~15. 0 ★ [7. 0]

Function

Carrier frequency setting minimum Khz unit limit

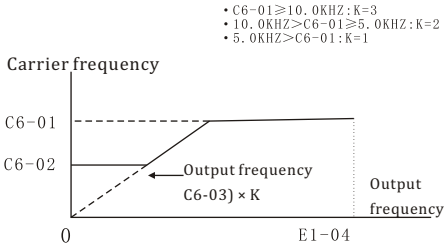
C6-03 (Carrier Gain) X A A X X

SettingRange

00~99 ★ [00]

Function

Set the carrier frequency upper limit and lower limit in kHz units.



Description of choice

The carrier frequency characteristics differ according to the con-trol method.V/f control and V/f with PG feedback control: Carr-ier frequency variable setting possible. Open -loop vector control and flux ve-ctor control: Constant frequency (The carrier frequency upperlimit only is set.)

The setting range for the carrier frequency upper limit is as follo -ws for the control methods:
S V/f control (with or without PG): 0.4 to 15.0
S Vector control (open-loop or flux): 2.0 to 15.0

To make the carrier frequency constant, either set the same valu-e for constants C6-01 and C6-02 orset the carrier frequency proportional gain (constant C6-03) to "0" (i.e., fix at upper limit value). Thefollowing settings willgenerate a constant setting fault (OPE11):Carrier frequency upper limit (C6-01) > 5.0 kHz and carrier frequency lower limit(C6-02) ≤ 5.0 kHz Carrier frequency proportional gain (C6-03) > 6 and (C6 -01) < C6-02)

In the vector control modes, the carrier frequency is determined by the carrier frequency upper limit(constant C6-01). In the V/f control modes (both with and without PG), the carrier frequency can bechanged in response to the output frequency by setting the carrier frequency lower limit (constantC6-02) and the carrier frequency proportional gain (constant C6-03).

5. 3. 7Hunting Prevention: C7

C7-01 (Hunt Prev Select) X A A X X

SettingRange

Disabled [0]
Enabled ★ [1]

Function

The hunting prevention functionis used to stop a motor undera light load from hunting.This function is exclusively forthe V/f control mode.When greater responsivenessthan oscillation control is required,set hunting preventionto "disabled."

C7-02(Hunt Prev Gain)X A A X X

SettingRange

0.00~2.50 ★[1.00]

Function

Sets the ratio for hunting prevention gain.

Description of choice

Increase the setting in C7-02 if oscillation occurs when operating with a light load.If the setting is increased too much, the current can fall to the point where stalling occurs.)
Disable the hunting-prevention function (C7-01 = 0) if high resp-onsiveness is more important than suppressing oscillation.

5. 3. 8Factory Tuning: C8

C8-08 (AFR Gain) X X X A X

SettingRange

0.00~10.00 ★ [1.00]

Function

Sets the internal speed feedback detection control section as a ratio.

Description of choice

Normally it isn't necessary to change this setting.Fine-tune the gain when motor operation is unstable causing hunting to occur or torque/speed responsive nessis low.When hunting occurs, increase the gain by 0.05 incre-ments while checking the motor responsiveness.When responsiveness is low, decrease the gain by 0.05 increments while checking the motor responsiveness.

C8-09 (AFR Time) X X X A X

SettingRange

0~2000 ★ [50]

Function

Sets the internal speed feedback detection control section as a ratio.

C8-30(Carrier in tune) X X X A A

SettingRange

2KHz [0]
C6-01 ★ [1]
Cifi Carrier frequency is set to5 kHz. (2.5 kHz for 400Vclass, 185 to 300 kW inverters) [2]

Function

Sets the internal speed feedback detection control section as a ratio.

5. 4Reference Constants: d

5. 4. 1Preset Reference: d1

d1-01 (Reference 1) 0 Q Q Q Q

SettingRange

0~400.00 ★ [0.00]

Function

Sets the frequency reference

d1-02 (Reference 2) 0 Q Q Q Q

SettingRange

0~400.00 ★ [0.00]

Function

The frequency reference when the multi-function input "multi-step speed reference 1" is ON.

d1-03 (Reference 3) 0 Q Q Q Q

SettingRange

0~400.00 ★ [0.00]

Function

The frequency reference when the multi-function input "multi-step speed reference 2" is ON.

d1-04 (Reference 4) 0 Q Q Q Q

SettingRange

0~400.00 ★ [0.00]

Function

The frequency reference when the multi-function input "multi-step speed reference 1, 2" is ON. p

d1-05 (Reference 4) 0 B B B B

SettingRange

0~400.00 ★ [0.00]

Function

The frequency reference when themulti-function input "multi -step speed reference 3" is ON.

d1-06 (Reference 6) 0 B B B B

SettingRange

0~400.00 ★ [0.00]

Function

The frequency reference when the multi-function input "multi-step speed reference 1, 3" is ON. p ,

d1-07 (Reference 7) 0 B B B B

SettingRange

0~400.00 ★ [0.00]

Function

The frequency reference when the multi-function input "multi-step speed reference 2, 3" is ON. p ,

d1-08 (Reference 8) 0 B B B B

SettingRange

0~ 00.400 ★ [0.00]

Function

The frequency reference when the multi-function input "multi-stepspeed reference 1, 2, 3" is ON. p ,

d1-09 (Jog Reference) 0 Q Q Q Q

0~400.00 ★ [6.00]

Function

The frequency reference when themulti-function inputs, "Jog frequency reference selection," "FJOG command," and "RJOGJOG co a d, a d JOG command" are ON.

Description of choice

The units for these values are set in o1-03.
The frequency reference default value and set value will change when o1-03 is changed.For example, if preset reference 1 is set to 6.00 Hz and o1-03 is changed to 1 (0.01% units), the settingfor preset reference 1 will become 10.00%.When using preset references 2 through 8, be sure to set multi-step speed references 1, 2, and 3 in themulti-function inputs (H1-01 through H1-06) as required. When using the jog functio, set the jog frequency reference in constant d1-09. When jogging froman external terminal, set the multi-function inputs (H1-01 through H1-06) to "Jog Frequency Reference,""Forward Jog," or "Reverse Jog" as required.The multi-function input setting is unnecessary when jogging from the Operator.

5. 4. 2Reference Limits: d2

d2-01(Ref Upper Limit)X B B B B

SettingRange

0.0~110.0 ★ [100.0]

Function

Sets the output frequency upperlimit as a percentage of the maxi - maximum

d2-02(Ref Lower Limit)X B B B B

SettingRange

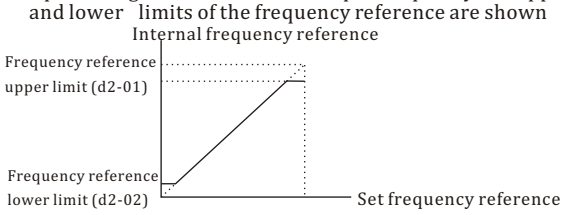
0.0~109.0 ★ [0.0]

Function

Sets the output frequency lower limit as a percentage of the maxi- maximum output frequency.

Description of choice

When the frequency reference is zero and a run command is input, the motor operates at the frequencyreference lower limit (d2-02). The motor will not operate, however, if the lower limit is set lower than the minimum output frequency (E1-09).
The frequency reference upper and lower limits are set as a percentage of the maximum output frequencyThe upper and lower limits of the frequency reference are shown



Upper and Lower Limits of the Frequency Reference

5. 4. 3Jump Frequencies: d3

d3-01 (Jump Freq 1) X B B B B

SettingRange

0~400.00 ★ [0.0]

Function

Set the center values of the jump frequencies in Hz

d3-02 (Jump Freq 2) X B B B B

SettingRange

0~400.00 ★ [0.0]

Function

Set the center values of the jump frequencies in Hz.

d3-03 (Jump Freq 3) X B B B B

SettingRange

0~400.00 ★ [0.0]

Function

Set the center values of the jump frequencies in Hz.

d3-04(Jump Bandwidth)X B B B B

SettingRange

0.0~20.0 ★ [1.0]

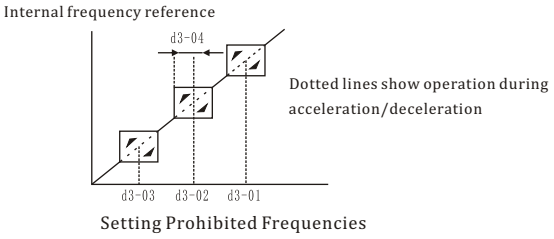
Function

The jump frequency will be thejump frequency ± d3-04.

Description of choice

This function allows the prohibition or "jumping" of certain frequencies within the Inverter's outputfrequency range so that the motor can operate without resonant oscillations caused by some machine systems.

For d3-01 to d3-03, set the center values of the frequencies to be jumped. Be sure to set the jump frequencyso that d3 -03 ≤ d3-02 ≤ d3-01. For d3-04, set the jump frequency bandwidth. The jump frequency ± the jump frequency bandwidthbecomes the jump frequenc range. Operation is prohibited within the jump frequency range, but changes during acceleration and decelerationare smooth with no jumps. The relation between the internal frequency reference and the set frequency references



Setting Prohibited Frequencies

5. 4. 4Reference Frequency Hold: d4

d4-01(MOP Ref Memory) X A A A A

SettingRange

Disabled (when operation is stopped or the power is turned on again starts at 0.)v ★ [0]

Enabled (when operation is stopped or the power is turned on again starts at the previoushold frequency.) [1]

Function

Sets whether or not frequencies on hold will be recorded.

Description of choice

Constant d4-01 is enabled by making either of the following settings for the multi-function inputsH1-01 to H1-06).
• Acceleration/deceleration ramp hold (setting: A)
• Up command (setting: 10)/down command (setting: 11)
When hold status is established by these external signals, specify whether or not the output frequencyis to be retained. When this function is enabled, operation is re-started after power-up using the frequency reference value that was retainedFor information regarding the acceleration/deceleration stop (hold) command and the up/down command,refer to the description of Multi-function Inputs (H1).

d4-02 Addition and subtraction instruction limit X A A A A

SettingRange

1~100 ★ [25]

Function

Sets the increase/decrease frequencyfor analog frequency referencesas a percentage of themaximum output frequency.a u eque cy.

Description of choice

The trim control level is valid when the trim control increase command (setting: 1C) or trim controldecrease command (setting: 1D) is set for a multi-function input (H1-01 to H1-06). If the trim control increase command is ON when a frequency reference is input on the analog input,the trim control level will be added to the analog frequency reference and then output as the outputfrequency. If the trim control decrease command is ON, the frequency reference will be decreased bythe trim control level Refer to the description of Multi-function Inputs (H1) for details on the trim control increase and trimcontrol decrease commands.

5. 4. 5Torque Control: d5

d5-01 (Torq Control Sel) X X X X A

SettingRange

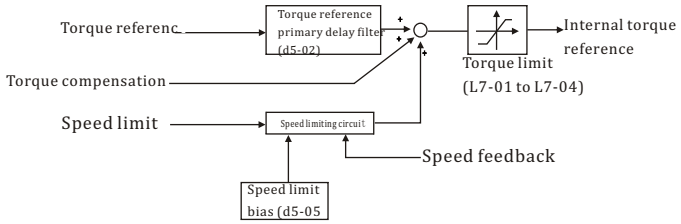
Speed control ★ [0]
Torque control [1]

Function

With flux vector control, the motor's output torque can be controlled by a torque reference from an analog input.

Description of choice

Set constant d5-01 to "1" to select torque control.
Set constant d5-01 to 0 (speed control) when using the speed/torque control switching function.



d5-02(Torq Ref Filter) X X X X A

SettingRange

1~1000 ★ [0]

Function

Sets the torque reference delay time in ms units.

Description of choice

The time constant of the primary filter in the torque reference section can be adjusted.This constant is used to eliminate noise in the torque reference signal and adjust the responsivenessto the host controller..Set the torque reference filter primary delay time constant in ms units. Increase the time constant setting if oscillation occurs during torque control operation.

d5-03(Speed Limit Sel) X X X X A

SettingRange

The analog input limit from an analog frequency reference terminal (terminals 13 and 14.) ★ [1]
Limited by d5-04 constant settingvalues. [2]

Function

Sets the speed limit command method for the torque control mode

Description of choice

D Limit with Analog Input (d5-03 = 1)
• The speed limit value is set by the input voltage (H3-01)
• When frequency reference (current) terminal 14 has been to frequency reference (voltage) terminal13.
set to frequency reference by settingconstant H3-09 to 1F, this terminal is also used as an input terminal for the speed limit. In this case, the actual speed limit value is the sum of the voltage input value at terminal 13 andthe current input value at terminal 14.• The polarity of the speed limit signal and the direction of the run command determine the directionin which the speed is limited.• +Voltage input: Forward rotation; Speed is limited in the forward direction.Reverse rotation; Speed is limited in the reverse direction.• –Voltage input: Forward rotation; Speed is limited in the reverse direction.Reverse rotation; Speed is limited in the forward direction.• The speed limit value is zero for rotation opposite to the speed limi direction.For example, when a +voltage is being input and the forward rotation command is ON, the effectiverange of the torque control is from zero to the speed limit value in the forward direction (whenconstant d5-05, the speed limit bias, is set to 0).

d5-04 (Speed Limit Sel) X X X X A

SettingRange

-120~+120 ★ [0]

Function

Sets the speed limit during torque control as a percentage of themaximum output frequency.

Description of choice

Set the speed limit as a percentage of the maximum frequency. (The max. frequency is 100%.) Thesign of the constant setting and the direction of the run command determine the direction in which the speed is limited.

Setting +: Forward rotation; Speed is limited in the forward direction.Reverse rotation; Speed is limited in the reverseSetting −: Forward rotation; Speed is limited in the reverse direction.Reverse rotation; Speed is limited in the he speed limit value is zero for rotation opposite to the speed limit direction.For example, when a positive value is set in d5-04 and the forward rotation command is ON, theeffective range of the torque control is from zero to the speed limit value in the forward direction (when constant d5-05 , the speed limit bias, is set to 0).

d5-05 (Speed Limit Sel)	X	X	X	X	A

SettingRange

0~120 ★ [10]

Function

TSets the speed limit command method for the torque control mode

Description of choice

The speed limit bias can be used to add margins to the speed limit.When the speed limit bias is used, it is possible to set the same speed limit value in both the forwardand reverse directions.Set the speed limit bias as a percentage of the maximum output frequency. (The max. frequency is100%.) For example, the following settings establish speed limits of 50% of the maximum output frequency in both the forward and reverse directions.• Speed limit setting: Zero (with d5-04 as the speed limit: d5-03 = 2, d5-04 = 0)
• Speed limit bias setting: 50% (d5-05 = 50)
When a forward speed limit and a speed limit bias have been set, the speed range of the torque controlis from the "−speed limit bias setting" to the "speed limit setting + speed limit bias setting.In effect, the speed limit range is extended by the speed limit bias in both the forward and reverse directions.

d5-06(Ref Hold Time)	X	X	X	X	A

SettingRange

0~1000 ★ [0]

Function

Sets the delay time from inputting the multi-function input "speed/torque control change" (from ONto OFF or OFF to ON) until the control is actually changed, in ms units.

Description of choice

This setting specifies the only has been set in one of the multi-function inputs (H1-01to H1-06).
Sets the delay time from inputting the multi-function input "speed/torque control change" (from ONto OFF or OFF to ON) until the control is actually changed, in ms units.During the timer delay, the value of the 3 analog inputs will retain the values they had when the ON/OFF status of speed/torque control switching signal was changed. Use this delay to make any preparationsfor the change in the control mode.

5. 5. 1Motor Constant Constants: E

E1-01(Input Voltage)	X	Q	Q	Q	Q

SettingRange

155~460VAC ★[400VAC]

Function

Sets the Inverter input voltage in units of 1V.

Description of choice

This setting is used as the reference value for functions such as the protection functions.
Set the Inverter input voltage (E1-01) to match the power supply voltage.

E1-02(Motor Selection)	X	Q	Q	Q	Q

SettingRange

Standard fan-cooled motor (general-purpose motor)★ [0]
Standard blower-cooled motor (Inverterexclusive motor) [1]
Special motor (vector-exclusive motor) [2]

Function

Motor selection (motoroverheating protection)

Description of choice

Set the type of motor being used with the motor selection consta −nt. This setting is a reference or overheating protection functions.

E1-03(v/f Selection)	X	Q	Q	X	X

SettingRange

0 to E: Select from the 15 preset patterns. [0]
Custom user-set patterns (Applicable forsettings E1-04 to E1-10.) ★ [F]

Function

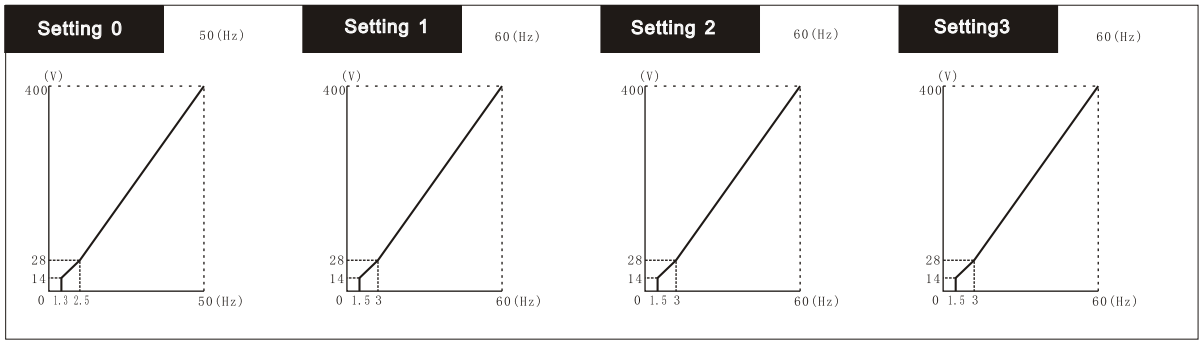
V/f pattern selection

Description of choice

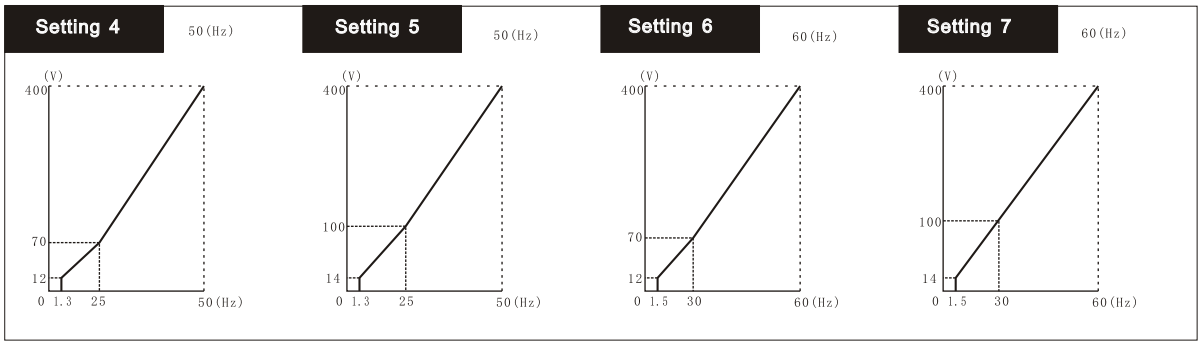
The V/f pattern can be set to any of the following:
• One of 15 preset patterns (settings 0 through E)
• A custom user-set pattern (setting F)

V/f Patterns: 2.2 to 45kW

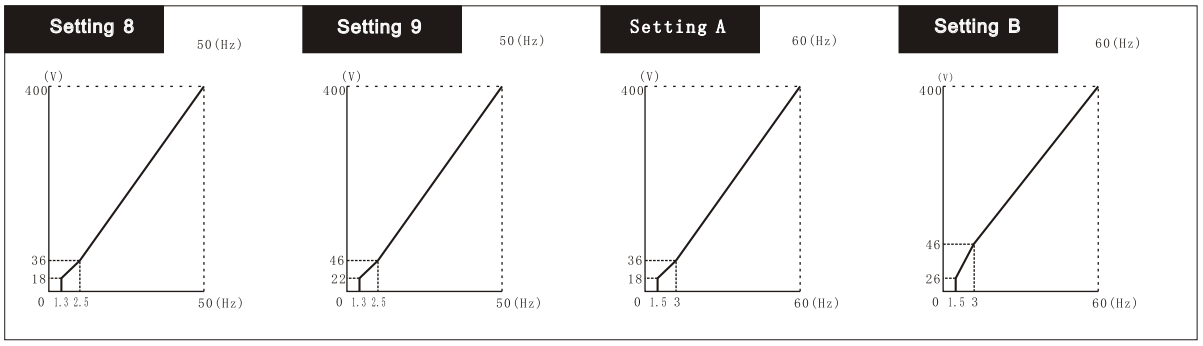
- Fixed Torque Characteristics(Settings 0 to 3)



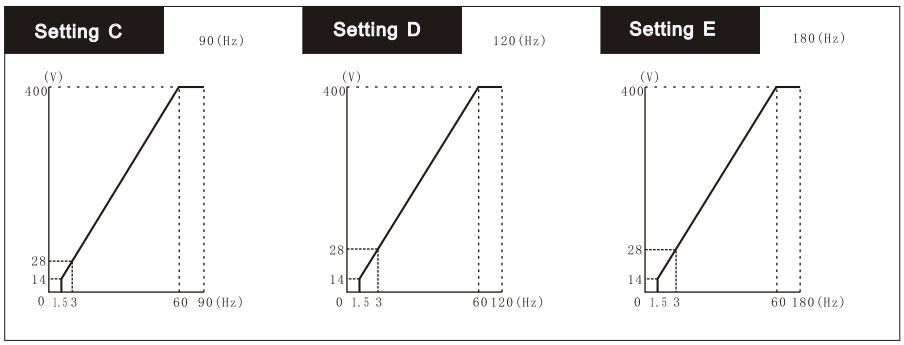
- Variable Torque Characteristics (Settings 4 to 7)



- High Starting Torque Characteristics(Settings 8 to b)

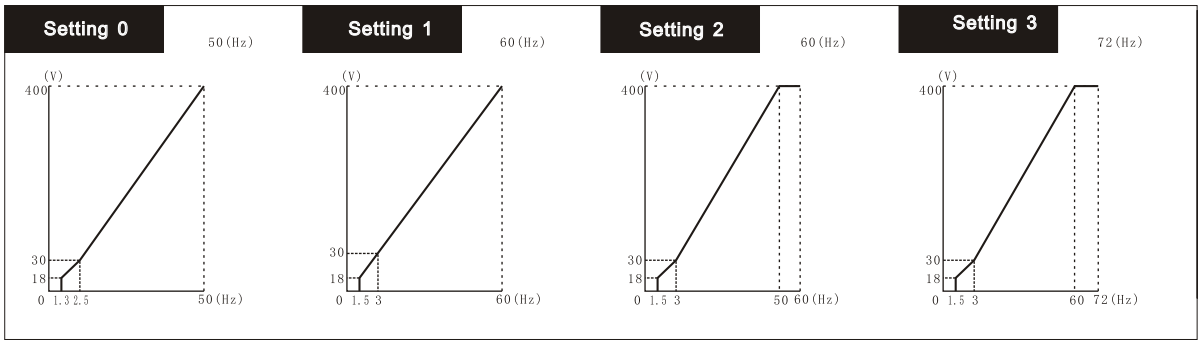


- High-speed Operation(SettingsCtoE)

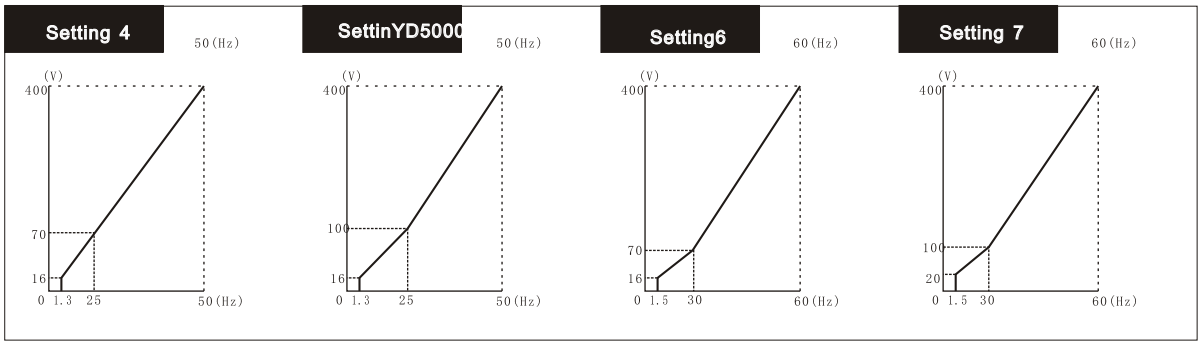


V/fPatterns:0.4 to 1.5kW

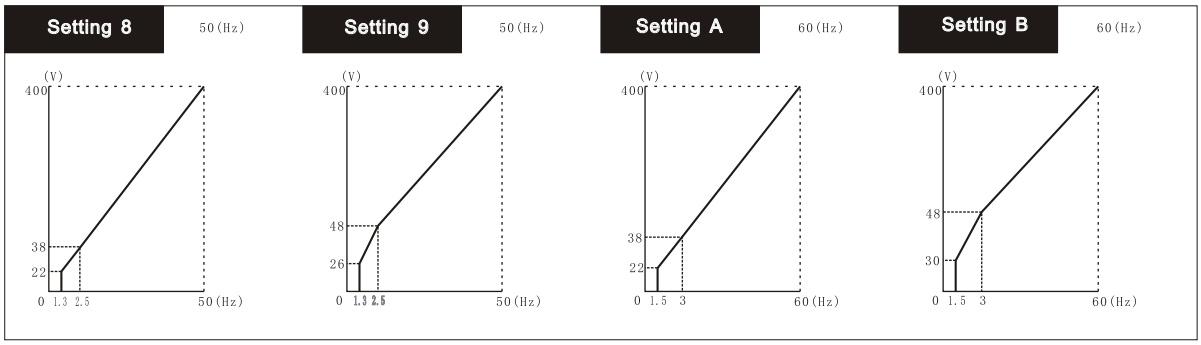
- Fixed Torque Characteristics (Settings 0 to 3)



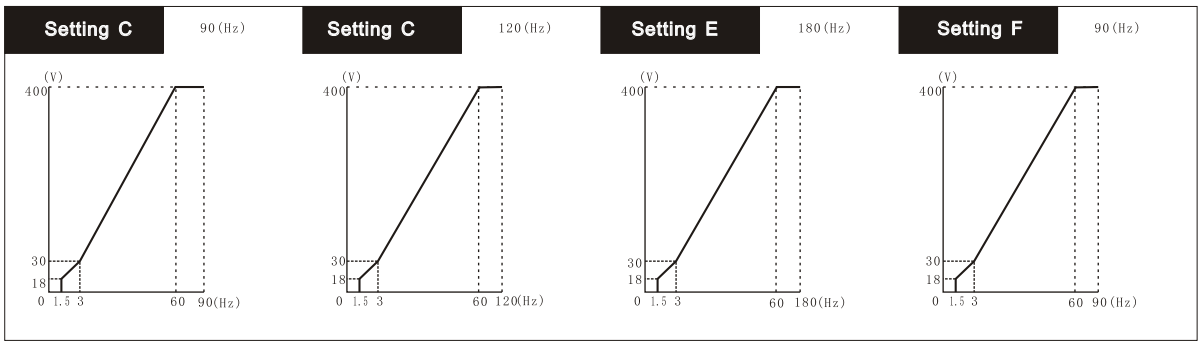
- Variable Torque Characteristics (Settings 4 to 7)



- High Starting Torque Characteristics (Settings 8 to b)

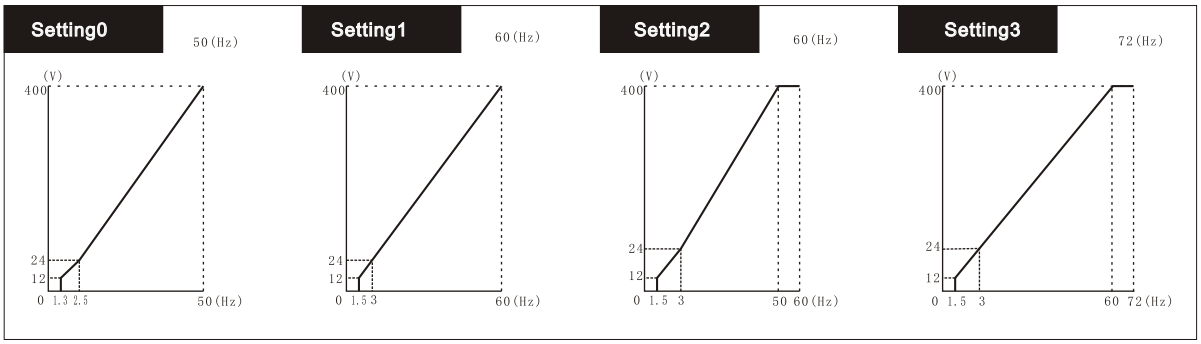


- High-speed Operation(Settings C to E)

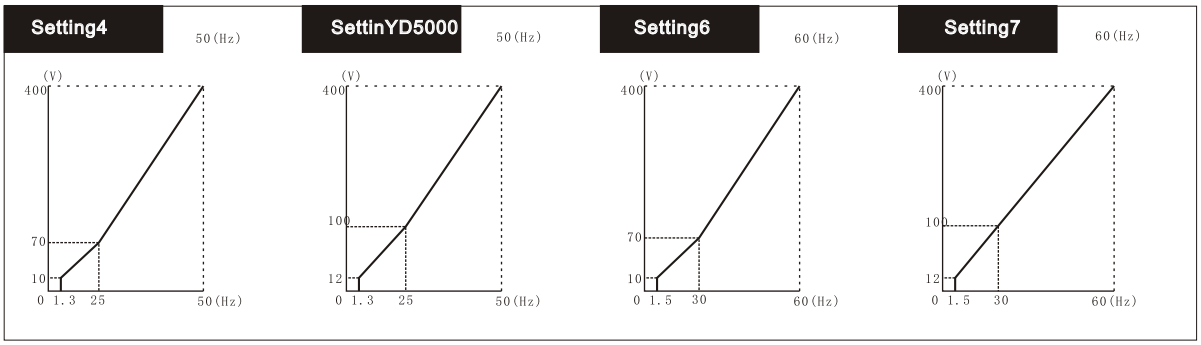


Variable Torque Characteristics(Settings 4 to 7)

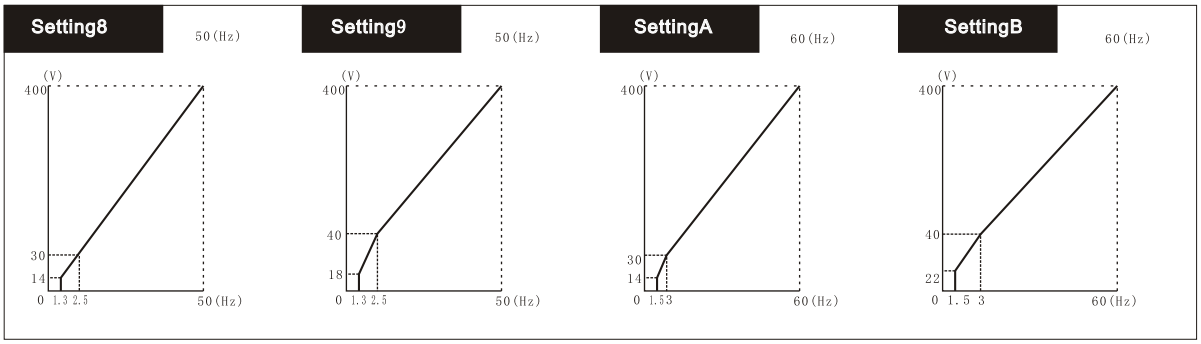
● Fixed Torque Characteristics(Settings 0 to 3)



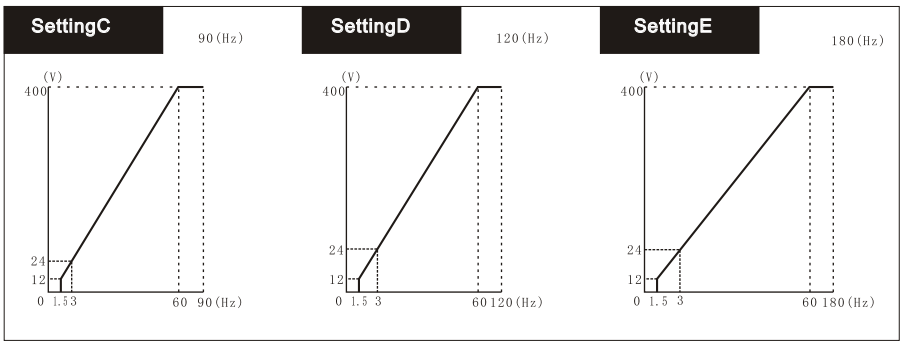
● Variable Torque Characteristics (Settings 4 to 7)



● High Starting Torque Characteristic (Settings 8 to b)



● High-speed Operation (Setting C to E)



E1-04 (Max Frequency) X Q Q Q Q

SettingRange

40.0~400.0 ★ [60.0]

Function

Set V / F curve

E1-05 (Max Voltage) X Q Q Q Q

SettingRange

0.0~510.0 ★ [400.0]

Function

Set V / F curve

E1-06 (Base Frequency) X Q Q Q Q

SettingRange

40.0~400.0 ★ [60.0]

Function

Set V / F curve

E1-07 (Mid Frequency A) X Q Q A X

SettingRange

40.0~400.0 ★ [3.0]

Function

Set V / F curve

E1-08 (Mid Voltage A) X Q Q A X

SettingRange

0.0~510.0 ★ [22.0]

Function

Set V / F curve

E1-09 (Min Frequency) X Q Q Q Q

SettingRange

0.0~400.0 ★ [0.5]

Function

Set V / F curve

E1-10 (Min Voltage) X Q Q Q A

SettingRange

0.0~510.0 ★ [4.0]

Function

Set V / F curve

E1-11 (Mid Frequency B) X A A A A

SettingRange

0.0~400.0 ★ [0.0]

Function

Set only to fine-adjust V/f for the output range when using flux control.Normally, this setting is not required.

E1-12 (2 (VC)) X A A A A

SettingRange

0.0~510.0 ★ [0.0]

Function

Set only to fine-adjust V/f for the output range when using flx vector control.Normally, this setting is not required.

E1-13 (Base Voltage) X A A Q Q

SettingRange

0.0~510.0 ★ [0.0]

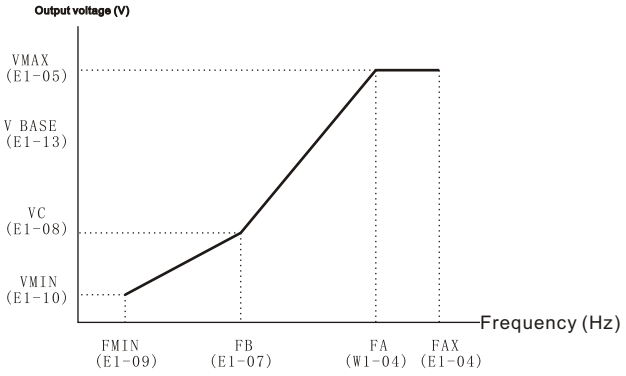
Function

Set only to fine-adjust V/f for the output range when using flux vector control.Normally, this setting is not required.

SettingRange

Constants E1-04 through E1-10 can be set by the user when E1-03 has been set to "F." These constantsare read-only when E1-03 isn't set to "F."When making the V/f characteristics a straight line, set the same value in E1-07 (middle output frequency)and E1-09 (minimum output frequency). In this case, constant E1-08 (middle output frequency voltage) will be disregarded.

E1-04 (FMAX) ≥ E1-06 (FA) > E1-07 (FB) ≥ E1-09 (FMIN)



User-defined V/f Pattern

5. 5. 2ThMotor Setup: E2

E2-01 (Motor Rated FLA) X Q Q Q Q

SettingRange

Click capacity may be based on ★

Function

Sets the motor rated current in 1 A units.

Description of choice

Set the rated current (A) shown on the motor nameplate.

E2-02 (motor Rated Slip) X A A Q Q

SettingRange

0.00~20.00 ★

Function

Sets the motor rated slip in Hz units.

Description of choice

This setting is used as a reference value for the torque compensation function.Calculate the rated slip from the value shown on the motor nameplate with the following equation and set this value.
Rated slip = rated frequency (Hz) – rated speed (r/min) × numbe r of poles/120

E2-03 (no-load Current) X A A Q Q

SettingRange

The default setting depends upon the Inverter capacity. ★

Function

Sets the motor no-load current in 1 A units.

Description of choice

Set the no-load current (E2-03) at the rated voltage and rated frequency. Normally this value isn'tshown on the motor nameplate, so it might be necessary to contact the motor manufacturer.

E2-04 (number Of Poles) X X Q X Q

SettingRange

2~48 ★ [4]

Function

Sets the number of motor poles.

Description of choice

Set constant to the number of poles shown on the motor nameplate.

E2-05 (term Resistance) X A A A A

SettingRange

0.000~65.000 ★

Function

Sets the motor phase-to-phase resistance in Ω units.

SettingRange

This setting is used as a reference value for the torque compensation function.
The default setting depends upon the Inverter capacity.
Set the motor's terminal resistance (U-V, V-W, and W-U). Normally this value isn't shown on themotor nameplate, so it might be necessary to contact the motor manufacturer.

E2-06 (leak Inductance) X X X A A

SettingRange

0.0~40.0 ★

Function

Sets the voltage drop due to motor leakage inductance as a percentage of the motor rated voltage.

SettingRange

The default setting depends upon the Inverter capacity.Set the voltage drop This constant does not normally require setting because the Inverter automatically compensates during operation.Normally this value isn't shown on the motor nameplate, so it might be necessary to contact the motormanufacturer. It is also acceptable to set the loss (caused by the motor's leakage inductance) as a percentage.

E2-07 (Saturation Comp 1) X X X A A

SettingRange

0.00~0.50 ★ [0.50]

Function

Sets the motor iron saturation coefficient at 50% of magnetic flux.

E2-08 (Saturation Comp 2) X X X A A

SettingRange

0.00~0.75 ★ [0.75]

Function

Sets the motor iron saturation coefficient at 75% of magnetic flux.

Description of choice

Constants are not required when using the motor at or below the rated frequency.
Set these constants when operating at a frequency higher that the motor's rated frequency. Set the following values:
• Motor iron-core saturation coefficient 1: Iron-core saturation coefficient when magnetic flux is 50%.
• Motor iron-core saturation coefficient 2: Iron-core saturation coefficient when magnetic flux is 75%.
Normally these values aren't shown on the motor nameplate, so it might be necessary to contact themotor manufacturer. Operation will be possible with the factory-preset values.

E2-09 (Mechanical Loss) X X X X A

SettingRange

0.0~10.0 ★ [0.0]

Function

Sets motor mechanical loss as a percentage of motor rated output, W).

Description of choice

Normally it isn't necessary to change this setting in the following cases:• There is a large torque loss to the motor's bearings
• There is a large torque loss to a fan or pump
Set the mechanical loss as a percentage of the motor's rated output power (W). Constant E2-09 is used to compensate for torque lost mechanically in the motor.

E2-10 (Tcomp Iron Lose) X A A X A

SettingRange

0~6553.5 ★

Function

Sets motor iron loss n W units.

Description of choice

Factory setting varies according to the size of the frequency power, or damage to the motor (W) as the unit set is usually not necessary,but the power inverter power with the click of a big difference, set for motor power and frequency

5. 5. 3Motor 2 Control Method: E3

E3-01(Control Method) X A A A A

SettingRange

V/f control [0]
Open loop vector [1]
Open-loop vector control ★ [2]
Flux vector control [3]

5. 5. 4Motor 2 V/f Pattern: E4

E4-01 (V/F2 Max Freq) X A A A A

SettingRange

40.0~400.0 ★ [60.0]

Function

Set V / F curve

E4-02 (V/F2max Voltage)

SettingRange

0.0~510.0 ★ [400]

Function

Set V / F curve

E4-03(V/F2 Base Freq) X A A A A

SettingRange

0.0~400.0 ★ [60]

Function

Set V / F curve

E4-04 (V/F 2 Mid Freq)X A A A X

SettingRange

0.0~400.0 ★ [3.0]

Function

Set V / F curve

Description of choice

Constants E1-04 through E1-10 can be set by the user when E1-03 has been set to "F." These constantsare read-only when E1-03 isn't set to "F."
When making the V/f characteristics a straight line, set the same value in E1-07 (middle output frequency)and E1-09 (minimum output frequency). In this case, constant E1-08 (middle output frequencyvoltage) will be disregarded.

E4-05 (V/F2 Mid Voltage)X A A A X

SettingRange

0.0~510.0 ★[22.0]

Function

Set V / F curve

Description of choice

Constants E1-04 through E1-10 can be set by the user when E1-03 has been set to "F." These constantsare read-only when E1-03 isn't set to "F."
When making the V/f characteristics a straight line, set the same value in E1-07 (middle output frequency)and E1-09 (minimum output frequency). In this case, constant E1-08 (middle output frequencyvoltage) will be disregarded.

E4-06 (V/F2 Mid Freq) X A A A A

SettingRange

0.0~400.0 ★ [0.5]

Function

Set V / F curve

Description of choice

Constants E1-04 through E1-10 can be set by the user when E1-03 has been set to "F." These constantsare read-only when E1-03 isn't set to "F."
When making the V/f characteristics a straight line, set the same value in E1-07 (middle output frequency)and E1-09 (minimum output frequency). In this case, constant E1-08 (middle output frequencyvoltage) will be disregarded.

E4-07 (Min Voltage) X A A A X

SettingRange

0.0~510.0 ★ [4.0]

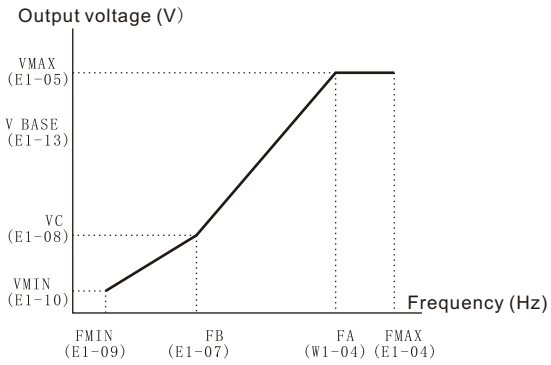
Function

Set V / F curve

Description of choice

Constants E1-04 through E1-10 can be set by the user when E1-03 has been set to "F." These constantsare read-only when E1-03 isn't set to "F."
When making the V/f characteristics a straight line, set the same value in E1-07 (middle output frequency)and E1-09 (minimum output frequency). In this case, constant E1-08 (middle output frequencyvoltage) will be disregarded.

E1-04 (FMAX) > E1-06 (FA) > E1-07 (FB) . = E1-09 (FMIN)



User-defined V/f Pattern

5. 5. 4Motor 2 Setup: E5

E5-01(Motor2 rated FLA)X A A A A

SettingRange

These values will automaticallybe set if they were set duringautotuning. ★

Function

Sets the motor rated current in 1 A units.

Description of choice

The setting range is 10% to 200% of the Inverter rated output current.
The default setting depends uponthe Inverter capacity. (The table
shows the default setting for 200Vclass, 0.4kWInverters.)

E5-02 (Motor2 Liip Freq)X A A A A

SettingRange

0.00~20.00 ★

Function

Sets the motor rated slip in Hz units.

Description of choice

The default setting depends upon the Inverter capacity.(The table shows the default settings for 200 V class, 0.4 kW Inverters.)Calculate the rated slip (E2-02) from the value shown on the motor nameplate with the following equationand set this value.Rated slip = rated frequency (Hz) – rated speed (r/min) × number of poles/120

E5-03 (Motor2 No-load lq) X A A A A

SettingRange

These values will be automatically set during autotuning.★

Function

Sets the motor no-load current in 1 A units.

Description of choice

Set the no-load current at the rated voltage and rated frequency. Normally this value isn'tshown on the motor nameplate, so it might be necessary to contact the motor manufacturer.

E5-04 (Motor2 # Poles)X X A X A

SettingRange

2~48 ★ [4]

Function

Sets the number of motor poles.

Description of choice

Please be recorded in the motor on the motor poles (pole) to set

E5-05 (Motor2 trem Ohms)X A A A A

SettingRange

0.000~65.000 ★

Function

Sets the motor phase-to-phase resistance in Ω units.

Description of choice

The default setting depends upon the Inverter capacity. (The table shows the default settings for 200 V class, 0.4 kW Inverters.)Set the motor terminal resistance (U-V, V-W, andW-U) in constant E2-05. Normally this value isn'tshown on the motor nameplate, so it might be necessary to contact the motor manufacturer for the terminalresistance at the insulation class temperature. Use the following equations to calculate the resistancevalue from the terminal resistance of a test report.

- E-class insulation: Terminal resistance at 75°C in the test report (Ω) x 0.92
- B-class insulation: Terminal resistance at 75°C in the test report (Ω) x 0.92
- F-class insulation: Terminal resistance at 115°C in the test report (Ω) x 0.87

E5-06 (Motor 2 Leak) X X X A A

SettingRange

0.0-40.0 ★

Function

Sets the voltage drop due to motorleakage inductance as a percentageof the motor rated voltage.

Description of choice

The default setting depends upon the Inverter capacity. Set the voltage drop as a percentage of the motor's ratedvoltage in constant This constant does not normally required setting because the Inverter automatically compensates duringoperation .Normally this value isn't shown on the motor nameplate, so it might be necessary to contact the motormanufacturer. It is also acceptable to set the loss (caused by the motor's leakage inductance) as a percentage.

5. 6Options Constants: F

5. 6. 1PG Option Setup: F1

F1-01 (PG Pulse/Rev) X X Q X Q

SettingRange

0~60000 ★ [600]

Function

Sets the number of PG (pulse generator or encoder) pulses

Description of choice

Set the PG (pulse generator or encoder) constant in pulses/revolution. Set the number of phase-A or phase-B pulses in one motor revolution.

F1-02 (PG Fdbk Loss Sel)X X B X B

SettingRange

Ramp to stop		[0]
Coast to stop	★	[1]
Fast stop		[2]
Continue operation		[3]

Function

Sets the PG disconnection stopping method.

Description of choice

Sets the PG open-circuit detection time and stopping method that is used when a break is detected inthe PG cable (PGO).

F1-03 (PG Overspeed Sel) X X B X B

SettingRange

Ramp to stop		[0]
Coast to stop	★	[1]
Fast stop		[2]
Continue operation		[3]

Function

Sets the stopping method when an overspeed (os) fault occurs.

Description of choice

Set the conditions (level and time) for detecting overspeed and the stopping method that is used whenan overspeed is detected.

F1-04 (PG Deviation Sel)X X B X B

SettingRange

Ramp to stop		[0]
Coast to stop		[1]
Fast stop		[2]
Continue operation	★	[3]

Function

Sets the stopping method when a speed deviation (DEV) fault occurs

Description of choice

These constants set the conditions (level and time) for detecting PG speed deviation and the stoppingmethod that is used when a PG speed deviation is detected.

F1-05 (PG Rotation Sel) X X B X B

SettingRange

Phase A leads with forward run command.	★	[0]
Phase B leads with forward run command.		[1]

This constant is used to coordinate the PG's rotation direction with the motor's rotation direction.

The setting for the standard applicable Yaskawa PG (made by SUMTAK) is an advanced phase A forforward rotation.Generally, phase A leads when the PG rotates in the clockwise direction (looking from the input axis).When a forward reference is output, the motor rotates in the counterclockwise direction (looking fromthe output axis).Set whether phase A or phase B leads when the motor operates in the forward direction.

F1-06 (PG Output Ra-tio) X X B X B

SettingRange

1~132 ★ [1]

Function

Sets the division ratio for the PG speed controlcard pulse output. Division ratio = (1+ n) /m (n=0,1 m=1 to 32)

Description of choice

This constant is effective only when a PG-B2 PG Control Card is used.It sets the division ratio used when the pulse monitor output is connected to a pulse input device.The first digit in the setting (0 or 1) is n and the second two digits (01 to 32) are m. The division ratiois calculated from n and m with the following equation:Division ratio = (1 + n)/m Setting Ranges n: 0, 1 m: 1 to 32 F1-06 = □□/n m Possible division rate settings are as follows: 1/32 ≦ F1-06 ≦ 1. For example, if the division rate isl /2 (a setting of "2"), the monitor output will be half of the number of pulses output from the PG.

F1-07 (PG Ramp PI/I Sel) X X B X X

SettingRange

Disabled ★ [0]
Enabled [1]

Function

Sets integral control during acceleration/decelerationto either enabled or disabled.

Description of choice

When "V/f control with PG feedback" is used, integral control during acceleration and decelerationcan be enabled or disabled with F1-07.Set F1-07 to "1" (integral control enabled) if you want to keep the motor speed as close to the frequencyreference as possible during acceleration and deceleration. Set F1-07 to "0" (integral control disabled) if you want to prevent the occurrence of overshooting/ undershooting.

F1-08 (PG Overspd level) X X A X A

SettingRange

0~120 ★ [115]

Function

Sets the overspeed detection method.

F1-09 (PG Overspd Time) X X A X A

SettingRange

0.0~2.0 ★ [0.0]

Function

Sets the overspeed detection method.

Description of choice

Frequencies above that set for F1-08 (set as q a percentage of the maximum output frequency),which continue to exceed this frequencyfor the detection time (F1-09), aredetected as overspeed faults.

F1-10(PG Deviate Level) X X A X A

SettingRange

0~50 ★ [10]

Function

Sets the speed deviation detection method.

F1-11 (PG Deviate Time) X X A X A

SettingRange

0.0~10.0 ★ [0.5]

Function

Sets the speed deviation detection method.

Description of choice

F1-10 and F1-11 Settings. Constant F1-10 sets the PG speed deviation detection level as a percentage of the maximum outputfrequency. Constant F1-11 sets the length of time in seconds that the difference between the motorspeed and reference speed must exceed the PG speed deviation detection level in order to detect a Pgspeed deviation (DEV).

F1-12 (PG # Gear Teeth 1) X X A X A

SettingRange

0.0~1000 ★ [0]

Function

Sets the number of teeth on the gears if thereare gears between the PG and the motor.

F1-13 (PG # Gear Teeth 2) X X A X X

SettingRange

0~1000 ★ [0]

Function

Sets the number of teeth on the gears if thereare gears between the PG and the motor.

Description of choice

When "V/f control with PG feedback" is used, the motor can be operated even if there are gears betweenthe motor and PG because the responsiveness is lower than it is with vector control.Set the number of teeth on the gears if there are gears between the motor and PG.

$$\text{Motor speed (r/min)} = \frac{\text{Number of pulses input from the PG} \times 60}{\text{Number of PG pulses (F1-01)}} \times \frac{\text{Number of gear teeth 2 (F1-13)}}{\text{Number of gear teeth 1 (F1-12)}}$$

A gear ratio of 1 (F1-12 = F1-13 = 1) will be used if either of these constants is set to 0.

F1-14 (PG open-cir-dettion time) X X A X A

SettingRange

0.0~10.0 ★ [2.0]

Function

PG disconnection detection time, in seconds

5. 6. 2Other Options Setup: F2 through F9

F2-01 (AI-14 Input Sel) X B B B B

SettingRange

3-channel individual ★ [0]
3-channel addition [1]

Function

Sets the functions for channel 1 to3 which are effective when theAI-14B Analog Reference Card is used.

Description of choice

When using a AI-14B/A1-14U Analog Reference Card, set constant b1-01 (reference selection) to "3"option). When using a AI-14B, set the function for channels 1 to 3 with constant F2-01. (There are no constantsto set for AI-14U.) Constant b1-01 (reference selection) must be set to "1" (external terminal), when 3-channel individualinput (setting: 0) is set. When using a AI-14B and setting 3-channel individual input, the multi-function inputs cannot be setto the Option/Inverter selection function (setting: 2).

F3-01 (DI Input) X B B B B

SettingRange

BCD 1% ★ [0]
BCD0.1% [1]
BCD0.01% [2]
BCD1Hz [3]
BCD0.1Hz [4]
BCD0.01Hz [5]
BCD special setting [6]
Binary input [7]

Function

Sets the Digital Reference Card input method.

Description of choice

When using a DI-08 or DI-16H2 Digital Reference Card, set constant b1-01 (reference selection) to"3" (option) and set the input method with constant F3-01.The maximum frequency (100% speed) reference will be used when the binary input is set (setting:7) and all bits are "1."

- DI-08: Maximum output frequency reference (255/100%).
- DI-16H2: Maximum output frequency reference (16 bits: 30000/100%, 12 bits: 4095/100%).Setting 6, BCD special setting (5-digit input), is valid only when the D1-16H2 is used. Using this setting,a frequency from 0.00 to 399.98 Hz can be set in BCD. The data input method is different from that for settings of 1 to 5.

Setting: 1 to 5	Sign	8×10^3	4×10^3	2×10^3	1×10^3
Setting: 6	2×10^4	1×10^4	8×10^3	4×10^3	2×10^3
		8×10^0	4×10^0	2×10^0	1×10^0
		1×10^1	8×10^0	4×10^0	2×10^0

The sign bit is used as a data bit, so only positive (plus) data can be set.
The second digit below the decimal point is set by bits 8x100, 4x100, and 2x100, so the settings aremade in units of 0.02 Hz . (If these three bits are "111," "110," and "101," they will be recognized as"9.")
If "2" or higher is set for o1-03, the input will become BCD, and the units will change to the o1-03 setting.

F4-01 (AO Ch1 Select) X B B B B

SettingRange

1~38 ★ [2]

Function

Effective when the Analog Monitor Card is used.

F4-02 (AO Ch1 Gain) 0 B B B B

SettingRange

0.00~2.50 ★ [1.00]

Function

Effective when the Analog Monitor Card is used.

F4-03 (AO Ch2 Select) X B B B B

SettingRange

1~30 ★ [3]

Function

Effective when the Analog Monitor Card is used.

F4-04 (AO Ch2 Gain) 0 B B B B

SettingRange

0.00~2.50 ★ [0.50]

Function

F4-05 (AO Ch1 Bias) 0 B B B B

SettingRange

-10.0~10.0 ★ [0.0]

Function

Sets the channel 1 item bias to100%/10 V when the analog monitor card is useditor used.

F4-06 (AO Ch2 Bias) 0 B B B B

SettingRange

-10.0~10.0 ★ [0.0]

Function

Sets the channel 2 item bias to 100%/10 V when the analog monitor card is used itor used.

When using an AO-08 or AO-12 Analog Monitor Card, set the monitor items and gain with the followingconstants
●For the output monitor selections (F4-01, F4-03), set the numbers for the right side of the "U1"constants in the Table 4.3. The setting range is 1 to 38, but the following numbers cannot be set: 4, 10, 11, 12, 13, 14, 25, and 28 to 35.

●When the AO-12 is used, outputs of 0 to ±10 V are possible. For that, set constant H4-07 (multi-functionanalog output signal level selection) to "1" (0 to ±10 V outputs). There are some monitor items.However, that can only use outputs of 0 to +10 V even if constant H4-07 is set to "1."●When the AO-08 is used, only outputs of 0 to +10 V are possible regardless of the constant H4-07 setting.

F5-01 (DO-02 Ch1 Select)X B B B B

SettingRange

0.0~37 ★ [0]

Function

Effective when a Digital Output Card is used.Set the number of the multi-functionoutput to be output.

Description of choice

Set the output selections in the following constants when using a DO-02 Digital Output Card.
Set the number of the muli-fune-tion output to be output

F5-02 (DO-02 Ch2 Select) X B B B B

0.0~37 ★ [1]

Function

Effective when a Digital OutputCard is used.Set the number of the multi-functionoutput to be output.

Description of choice

Set the output selections in the following constants when using a DO-02 Digital Output Card.

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting
F5-01	Channel 1 output selection	×	00~37	×	0
F5-02	Channel 2 output selection	×	00~37	×	1

V/f Control	V/f with PG	OpenLoop Vector	Flux Vector
B	B	B	B
B	B	B	B

F6-01(DO-08 Select)X B B B B

SettingRange

channels of individual out outputs ★ [0]
Binary code output [1]

Function

Effective when a DO-08 DigitalOutput Card is used.Set the output mode.

Description of choice

Set the output mode in the following constants when using a DO-08 Digital Output Card.
The items output from the DO-08 will be as follows according to the setting of F6-01.

Setting	Terminal	utput
0: 8 channels of individual out outputs	TD5-TD11	Overcurrent (SC, OC, GF)
	TD6-TD11	Overvoltage (OV)
	TD7-TD11	Inverter overload (OL2)
	TD8-TD11	Fuse blown (PUF)
	TD9-TD11	Overspeed (OS)
	TD10-TD11	Inverter overheat (OH1) or motor overload (OL1)
	TD1-TD2	Zero speed detection
	TD3-TD4	Speed agree
1 : Binary code output	TD5-TD11	Bit 0
	TD6-TD11	Bit 1
	TD7-TD11	Bit 2
	TD8-TD11	Bit 3
	TD9-TD11	Zero speed detection
	TD10-TD11	Speed agree
	TD1-TD2	Running
	TD3-TD4	Minor fault

Coded Outputs

Bit 3210	Meaning	Bit 3210	Meaning
0000	No fault	1000	External fault (EF××)
0001	Overcurrent (SC, OC, GF)	1001	Controller fault (CPF××)
0010	Overvoltage (OV)	1010	Motor overload (OL1)
0011	Inverter overload (OL2)	1011	Not used
0100	Inverter overheat (OH, OH1)	1100	Power loss (UV1, Uv2, UV3)
0101	Overspeed (OS)	1101	Excessive speed deviation (DEV)
0110	Fuse blown (PUF)	1110	PG disconnected (PGO)
0111	Braking Resistor Unit overheat RH) Braking Transistor fault (RR)	1111	Not used.

F7-01(P0-36F Selection) X B B B B

SettingRange

01 x Inverter output frequency		[0]
6 x Inverter output frequency	★	[1]
10 x Inverter output frequency		[2]
12 x Inverter output frequency		[3]
36 x Inverter output frequency		[4]

Function

Effective when the Pulse MonitorCard is used.Sets the number of output pulses.

Description of choice

When using a P0-36F Pulse Monitor Card, set the output pulse in constant F7-01.

Setting Description

F= the output frequency dis- displayedin Hz.Example: When 0 (1F) is set,and the output frequency is 60Hz, 60 pulses per second areoutput. (50% duty)

F8-01 (E-15 Det Sel) 0 B B B B

Function

Deceleration to stop		[0]
Coast to stop	★	[1]
Emergency stop		[2]
Continue operation		[3]

F9-01(E-15 Selection)X B B B B

NO contact	★	[0]
NC contact		[1]

Function

External fault input level from Optical option

F9-02 (EF0 Detection)X B B B B

SettingRange

Always detect	★	[0]
Detect during operation		[1]

F9-03 (EF0 Fault Act) X B B B B

SettingRange

Deceleration to stop		[0]
Coast to stop	★	[1]
Emergency stop		[2]
Continue operation		[3]

F9-04 (Trace Sample Time) X B B B B

SettingRange

0~60000 ★ [0]

F9-05 (Torq Ref/Lmt Sel)X X X X B

SettingRange

Torque reference/ torque limit from transmission disabled.		[0]
Torque reference/ torque limitfrom transmission enabled.	★	[1]

F9-06(BUS Fault Sel) X B B B B

SettingRange

Decelerate to stop		[0]
Coast to stop	★	[1]
Emergency stop		[2]
Continue operation		[3]

Function

Sets stop method when transmission error (BUS) is detected.

Description of choice

Operation selectionwhen transmissionerror detected for transmission cardsother than SI-K2

5. 7Terminal Constants: H

5. 7. 1Multi-function Inputs: H1

H1-01 (Terminal 3 Sel)X B B B B

SettingRange

0~77 ★ [24]

Function

Multi-function input 1 (terminal 3)

Description of choice

Refer to the following instructions

H1-02 Terminal 4 Sel X B B B B

SettingRange

0~77 ★ [14]

Function

Multi-function input 2 (terminal 4)

Description of choice

Refer to the following instructions

H1-03 (Terminal 5 Sel) X B B B B

SettingRange

0~77 ★ [3(0)]

4

SettingRange

Multi-function input 3 (terminal 5)

Function

Refer to the following instructions

H1-04(Terminal 6 Sel)X B B B B

SettingRange

0~77 ★ [4(3)]

Function

Multi-function input 4 (terminal 6)

Description of choice

Refer to the following instructions

H1-05(Terminal 7 Sel)X B B B B

SettingRange

0~77 ★ [6(4)]

Function

Multi-function input 5 (terminal 7)

Description of choice

Refer to the following instructions

H1-06 (Terminal 8 Sel) X B B B B

SettingRange

0~77 ★ [8(6)]

Function

Multi-function input 6 terminal 8)

Description of choice

Refer to the following instructions

7.5.5 External Terminal Functions: H

This section describes the settings for the external terminal functions.

■ Multi-function Input Settings: H1

The settings and functions for the multi-function inputs are listed in Table 7.8.

Table 7.8 Multi-function Input Functions

Setting value	Function	ControlMethod			
		V/f	V/fw/PG	Open loop Vector	Flux vector
0	3-wire sequence(Forward/Reverse run command)	○	○	○	○
1	Local/Remote selection(ON:Operator,OFF:Constantsetting)	○	○	○	○
2	Option/Inverter selection(ON:Optioncard)	○	○	○	○
3	Multi-step speed reference 1 When H3-05 is setto"0,"this function is combined with "Master/auxiliary speed switch."	○	○	○	○
4	Multi-step speed reference 2	○	○	○	○
5	Multi-step speed reference 3	○	○	○	○
6	Jog frequency reference (higher priority than multi-step speed reference)	○	○	○	○
7	Accel/Decel time 1	○	○	○	○
8	External baseblock NO (NO contact:Baseblock at ON)	○	○	○	○
9	ExternalbaseblockNC(NCcontact:BaseblockatOFF)	○	○	○	○
A	Accel/Decel ramp hold(ON:Accel/decel stopped,frequency on hold)	○	○	○	○
B	OH2 alarm signal input (ON: OH2 will be displayed)	○	○	○	○
C	Multi-function analog input selection (ON: Enable)	○	○	○	○
D	No V/f control with PG (ON: Speed feedback control disabled,) (normal V/f control)	X	○	X	X
E	Speed control integral reset (ON: Integral control disabled)	X	○	X	—
F	Not used.	—	—	—	—
10	Up command (Always set with the down command)	○	○	○	○
11	Down command (Always set with the up command)	○	○	○	○
12	FJOG command (ON: Forward run at jog frequency d1-09)	○	○	○	○
13	RJOG command (ON: Reverse run at jog frequency d1-09)	○	○	○	○
14	Fault reset (Reset when turned ON)	○	○	○	○
15	Emergency stop (when NO contact is ON: Deceleration to stop in emergency stop time C1-09)	○	○	○	○
16	Motor switch command (Motor 2 selection)	○	○	○	○
17	Emergency stop (normally closed condition: Deceleration to stop in emergency when OFF) stop time C1-09	○	○	○	○
18	Timer function input (Functions are set with b4-01, b4-02 and the timer function is set at thesame time)	○	○	○	○
19	PID control disable (ON: PID control disabled)	○	○	○	○
1A	Accel/Decel time 2	○	○	○	○
1B	Constants write enable (ON: All constants can be written-in. OFF: All constants other than frequency monitor are write protected.)	○	○	○	○
1C	Trim control increase (ON: d4-02 frequencies are added to analog frequency references.)	○	○	○	○
1D	Trim control decrease (ON: d4-02 frequencies are subtracted from analog frequency references.)	○	○	○	○
1E	Analog frequency reference sample/hold	○	○	○	○
1F	Frequency reference terminal 13/14 selection (ON: selects terminal 14); valid only when H309=1F	○	○	○	○
20 to 2F	External fault (Desired settings possible) Input mode: NO contact/NC contact, Detection mode: Normal/during operation Stopping method: Deceleration to stop, coast to stop, emergency stop or continue operation.	○	○	○	○
30	PID control integral reset (ON: Reset)	○	○	○	○
31	PID control integral hold (ON: Hold)	○	○	○	○
60	DC injection braking command (ON: Performs DC injection braking)	○	○	○	○
61	External speed search command 1: Maximum output frequency (ON: speed search)	○	X	○	X
62	External speed search command 2: Set frequency (ON: speed search)	○	X	○	X
63	Energy-saving command (ON: Energy-saving control set for b8-01, b8-02)	○	○	X	X
64	External speed search command 3	○	○	○	○
65	KEB (deceleration at momentary power loss) command (NO contact)	○	○	○	○
66	KEB (deceleration at momentary power loss) command (NO contact)	○	○	○	○
71	Speed/torque control change (ON: Torque control)	X	X	X	○
72	Zero-servo command (ON: Zero-servo)	X	X	X	○
77	Speed control (ASR) proportional gain switch (ON: C5-03)	X	X	X	○

- The factory settings in parentheses are for when the Unit is initialized for 3-wire control.
- The following table shows the settings and section references for some common functions.

Function	Setting
3-wire sequence (forward/reverse run command)	0
Multi-step speed references 1 to 3 and jog frequency reference	3to6
Accel/Decel time 1 and 2	7, 1A
Emergency stop	15
FJOG/RJOG commands	12, 13
Terminal 13/14 switch	1F
Timer function input	18
Energy-saving command	63

Local/Remote Selection (Setting: 1)

OFF	Operate with the frequency reference and run command specified in b1-01 (the frequency reference source) and b1-02 (run source).
ON	Operate with the frequency reference and run command set at the Digital Operator.

- With this setting, the multi-function input selects the input method for the frequency reference and run command.
- The input method can be switched only when the Inverter is stopped.
- The Digital Operator LOCAL/REMOTE Key is disabled when this function has been set in a multifunction input.

Option Card/Inverter Selection (Setting: 2)

OFF	The Inverter frequency reference is enabled.
ON	The Option Card frequency reference is enabled.

- With this setting, the multi-function input enables the frequency reference input from the Inverter itself or the one from Option Card. The frequency reference input can be switched only when the Inverter is stopped.
- Be sure that b1-01 (the frequency reference source selector) has been set to 0 (Operator) or 1 (external terminals) only the frequency reference from the Option Card will be enabled if b1-01 is set to 3 (Option PCB).

External Baseblock NO (Setting: 8)

OFF	Normal operation
ON	Baseblock

Constant Settings

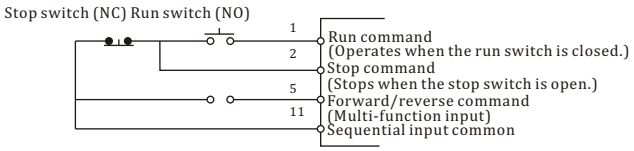
User Constant Number	Name	Change during Operation	SettingRange	Unit	Factory Setting	Valid Access Levels			
						V/f Control	V/f with PG	Open Loop Vector	Flux Vector
H1-01	Multi-function input 1 (terminal 3)	×	0 to 77	-	24	B	B	B	B
H1-02	Multi-function input 2 (terminal 4)	×	0 to 77	-	14	B	B	B	B
H1-03	Multi-function input 3 (terminal 5)	×	0 to 77	-	3 (0)	B	B	B	B
H1-04	Multi-function input 4 (terminal 6)	×	0 to 77	-	4 (3)	B	B	B	B
H1-05	Multi-function input 5 (terminal 7)	×	0 to 77	-	6 (4)	B	B	B	B
H1-06	Multi-function input 5 (terminal 8)	×	0 to 77	-	8 (6)	B	B	B	B

- The factory settings in parentheses are for when the Unit is initialized for 3-wire control.
- The following table shows the settings and section references for some common functions.

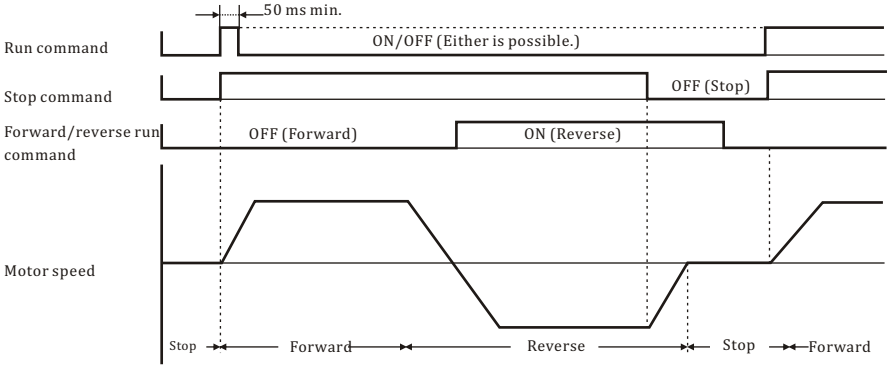
• 3-wire sequence (forward/reverse run command)	Setting 0
• Multi-step speed references 1 to 3 and jog frequency	Setting 3 to 6
• Accel/Decel time 1 and 2	Setting 7, 1A
• Emergency stop	Setting 15
• FJOG/RJOG commands	Setting 12, 13
• Terminal 13/14 switch	Setting 1F

3-wire Sequence (Forward/Reverse Run Commands): "0"

- When a value of "0" is set for any one of the multi-function inputs (H1-01 through H1-06), 3-wire sequencecontrol is used and the multi-function input terminal forwhich "0" was set becomes the forward/ reverse run command terminal.
- When the Unit is initialized for 3-wire sequence control with A1-03 , multi-function input 3 (terminal5) becomes the input terminal for the forward/reverse run command.



3-wire Sequence Wiring Example



Timing Chart for 3-wire Sequence

Multi-step Speed References 1 through 3 and JOG Reference: "3" to "6"

- Eight frequency references and one jog frequency reference can be used.
- Set the multi-step speed references 1, 2, and 3 and the JOG reference in the parameters H1-03 through H1-06. Change the status of these inputs while the unit is operating to select the desired frequency references.

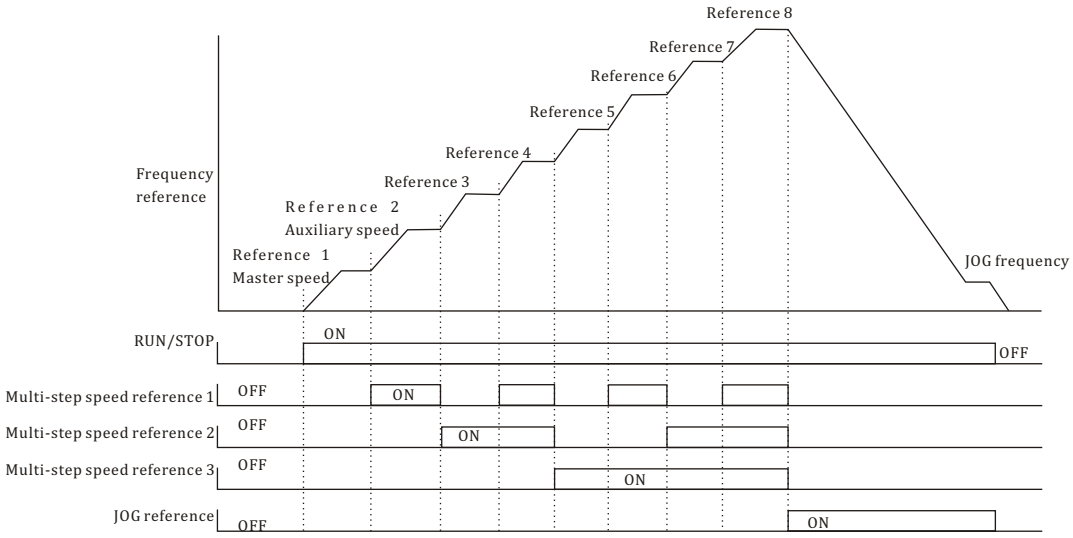
Terminal	Constant	Setting	Function
5	H1-03	3	Multi-step speed reference 1 (Also used for master-speed/auxiliary-speedswitching when an auxiliary reference is set for the multi-function analog input in H3-05.)
6	H1-04	4	Multi-step speed reference 2
7	HI-05	5	Multi-step speed reference 3
8	H1-06	6	JOG reference (This setting has higher priority than the multi-step speed reference.)

- The following table shows which frequency is selected by each possible combination of multi-step speed and JOG reference settings.

Terminal 5	Terminal 6	Terminal 7	Terminal 8	Selected frequency
Multi-step speed reference 1	Multi-step speed reference 2	Multi-step speed reference 3	JOG reference	
OFF	OFF	OFF	OFF	Reference 1: d1-01 (master speed frequency)
ON	OFF	OFF	OFF	Reference 2: d1-02 (auxiliary speed frequency)
OFF	ON	OFF	OFF	Reference 3: d1-03
ON	ON	OFF	OFF	Reference 4: d1-04
OFF	OFF	ON	OFF	Reference 5: d1-05
ON	OFF	ON	OFF	Reference 6: d1-06
OFF	ON	ON	OFF	Reference 7: d1-07
ON	ON	ON	OFF	Reference 8: d1-08
–	–	–	ON	Jog frequency: d1-09

Selecting 1-step and 2-step Frequency References

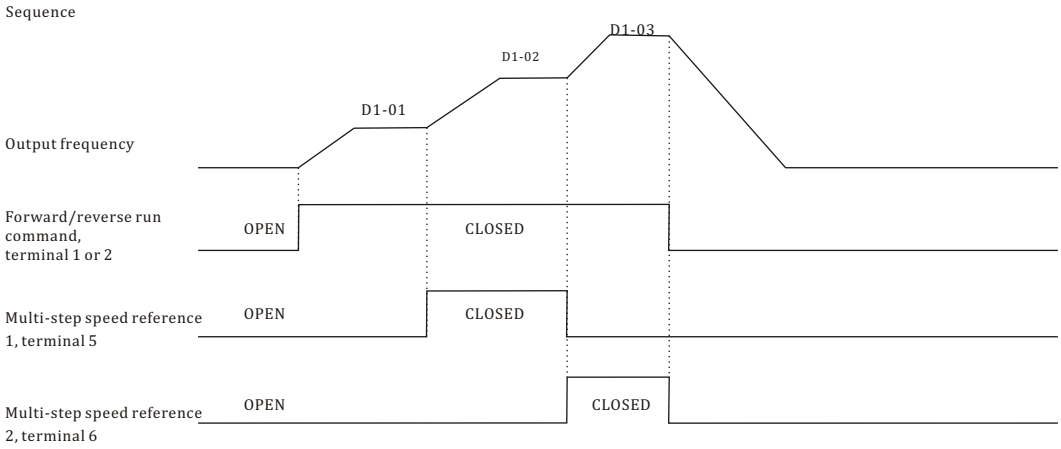
- To use the master frequency (analog terminal 13 or 14), set b1-01 to 1.
- To use frequency reference 1 (d1-01), set b1-01 to 0.
- To use the auxiliary frequency reference (analog terminal 16), use the factory setting.
- To use frequency reference 2 (d1-02), set H3-05 to 1F.

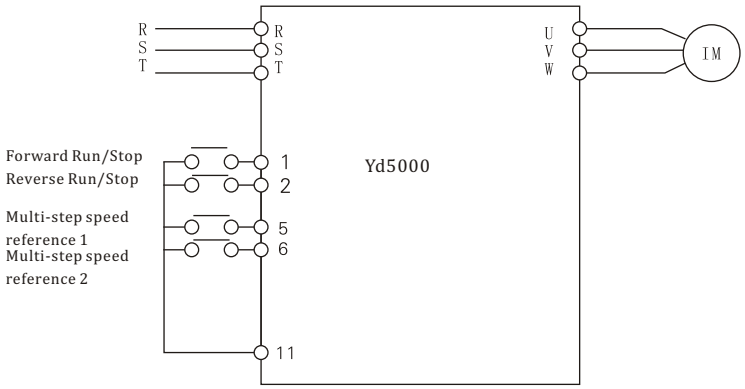


Timing Chart for Multi-step Speed and JOG References

Three-step Speed Operation Example

The following example shows three-step speed operation with frequencies set at Inverter constants.





User Constant Settings

Constant No.	Name	Setting
A1-01	Constant access level	3: Basic (B)
B1-01	Reference selection	0: Operator
D1-01	Frequency reference 1	::Hz (frequency setting)
D1-02	Frequency reference 2	::Hz (frequency setting)
D1-03	Frequency reference 3	::Hz (frequency setting)
H1-03	Multi-function input (terminal 5)	3: Multi-step speed reference 1 (factory setting)
H1-04	Multi-function input (terminal 6)	4: Multi-step speed reference 2 (factory setting)
H3-05	Multi-function input (terminal 16)	1F: Not used

Terminal 6 would not be needed if 2-step speed operation were required.

Acceleration/Deceleration Time Selectors 1 and 2: "7" and "1A"

- Four acceleration times and four deceleration times can be set. The multi-function inputs can be setas acceleration/deceleration time selectors 1 and 2 to switchbetween these acceleration and decelerationtimes.

Setting	Function
7	Acceleration/Deceleration time selector 1
1A	Acceleration/Deceleration time selector 2

- The following table shows which acceleration and deceleration times are selected by each possiblecombination of acceleration/deceleration time selectors 1 and 2.
- The acceleration and deceleration times can be changed while the Inverter is operating.

Accel/Decel Time Selector 1	Accel/Decel Time Selector 2	Acceleration Time	Deceleration Time
OFF or not set	OFF or not set	Acceleration time 1 (C1-01)	Deceleration time 1 (C1-02)
ON	OFF or not set	Acceleration time 2 (C1-03)	Deceleration time 2 (C1-04)
OFF or not set	ON	Acceleration time 3 (C1-05)	Deceleration time 3 (C1-06)
ON	ON	Acceleration time 4 (C1-07)	Deceleration time 4 (C1-08)

Emergency Stop: "15" and "17"

- When the multi-function input that is set as an emergency stop isturned ON, the motor will decelerate to a stopat the rate set with the deceleration timein C1-09 (emergency stop time).
- To clear the emergency stop, turn OFF the run command, turn OFF the emergency stop input, and then turn ON the run command again.
- Set "17" to make the emergency stop the normally closed condition.

Setting	Function
15	Emergency stop (normally open condition: Decelerates to stop when ON in the emergency stop period C1-09)
17	Emergency stop (normally closed condition: Decelerates to stop when OFF in the emergency stop period C1-09)

Forward and Reverse Jog Commands: "12" and "13"

The jogging can be performed in forward or reverse.

Setting	Function
12	Forward jog command: Runs forward at the jog frequency (d1-09).
13	Reverse jog command: Runs in reverse at the jog frequency (d1-09).

- The forward jog and reverse jog commands have priority over other frequency reference commands.
- The inverter will stop operation with the stopping method set in b1-03 if the forward jog and reverse jog commands are both ON for more than 500 ms.
- Turn ON either the forward jog command or the reverse jog command, not both.
- These jog commands can operate the Inverter independently. It isn't necessary for a forward/reverse run command to be input.

Terminal 13/14 Switch: "1F"

When this function is set for a multi-function input, that input terminal can be used to switch between terminal 13 and terminal 14.

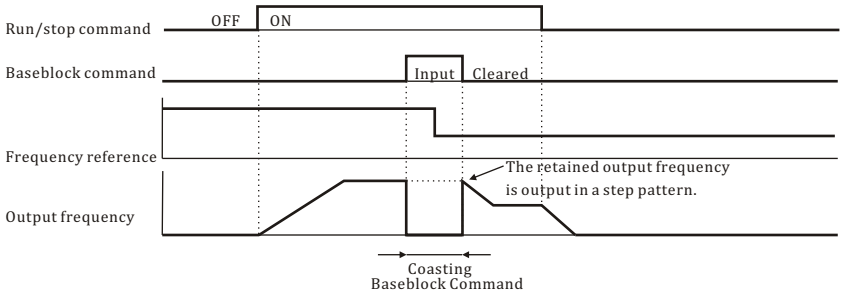
OFF	The analog input from terminal 13 is used as the master-speed frequency reference.
ON	The analog input from terminal 14 is used as the master speed frequency reference.

- When terminal 14 is used as the frequency reference, set "1F" (frequency reference) in constant H3-09;this constant is the function selector for (current) terminal 14. A setting fault(OPE03) will occur
- if this function is selected without setting "1F" in H3-09.When H3-09 is set to "1F" (frequency reference) but none of the multi-function inputs is set to "1F" (terminal 13/14 switch), the sum of the inputs and 14 will be used as the masterspeed frequency reference.

External Baseblock NC (Setting: 9)

OFF	Baseblock
ON	Normal operation

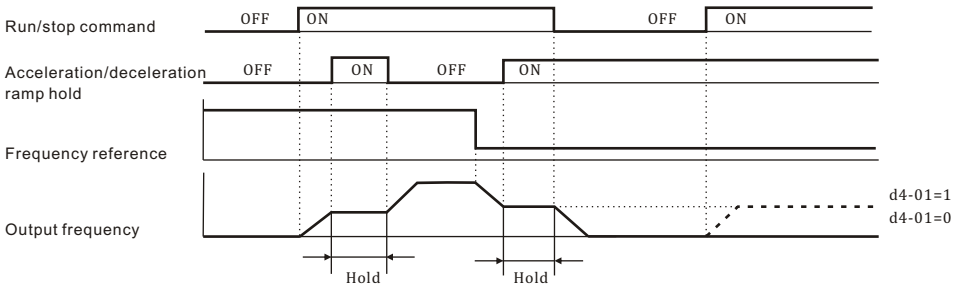
- With either of these settings, the multi-function input controls baseblock operation.
- Baseblock is an interruption of the Inverter output. The motor coasts while the baseblock command is being input.
- The output frequency is retained internally, so the same frequency will be output again when the baseblockcommand is cleared. The output frequency will change in a step pattern when the output resumes,so take some safety precaution such especially if the baseblocks turning OFF the run command –command was input when the motor was operating at high speed. (When the run command isturned OFF, the internally retained output frequency is reset to zero.)
- After a baseblock command is cleared, the voltage will be restored in the voltage recovery time set in



Acceleration/Deceleration Ramp Hold (Setting: A)

OFF	Normal operation or restart acceleration/deceleration.
ON	Pause acceleration/deceleration and maintain the present frequency.

- With this setting, the multi-function input pauses acceleration or deceleration and maintains (holds) the output frequency.
- Acceleration/deceleration is restarted when the acceleration/deceleration ramp hold input is turned OFF.
- The motor will be stopped if a stop command is input while the acceleration/deceleration ramp hold input is ON.
- When constant d4-01 (the frequency reference hold function selector) is set to 1, the held frequencywill be stored in memory. This stored frequency will be retained even after a power loss and the motorwill be restarted at this frequency when a run command is input again.



Acceleration/Deceleration Ramp Hold

- When d4-01 is set to 1, the held output frequency will be retained. To operate at this frequency evenafterthe Inverter is stopped,
- ON.input hold ramp theacceleration/deceleration with input is command run the if zero at held be will frequency output the 0, to set is d4-01 When input the run command with the acceleration /deceleration ramp hold input ON.

OH2 Alarm Signal (Setting: B)

OFF	Normal operation
ON	Normal operation (The warning message "OH2" will be displayed on the Digital Operator.)

- The message "OH2" will be displayed on the Digital Operator while the multi-function input is ON and the display will revert to its previous status when the input is turned OFF. (It isn't necessary to reset the alarm.) The Inverter will continue operation without detecting a fault.
- With this setting, a temperature sensor can be connected to the multi-function input to display a warning message when the temperature rises too high.

Multi-function Analog Input Selection (Setting: C)

OFF	Disables the multi-function analog input (terminal 16).
ON	Enables the multi-function analog input (terminal 16).

- With this setting, the multi-function input can be used to enable or disable the multi-function analog input.
- Turning the input OFF has the same effect as setting H3-05 (the multi-function analog input selector for terminal 16) to 1F.

No V/f Control with PG (Setting: D)

OFF	V/f control with PG feedback (enables speed control with speed feedback)
ON	Normal V/f control (disables speed feedback control.)

- With this setting, the multi-function input can be used to switch "V/f control with PG feedback" to "Normal V/f control." It is possible to switch between these control methods during operation.

Speed Control Integral Reset (Setting: E)

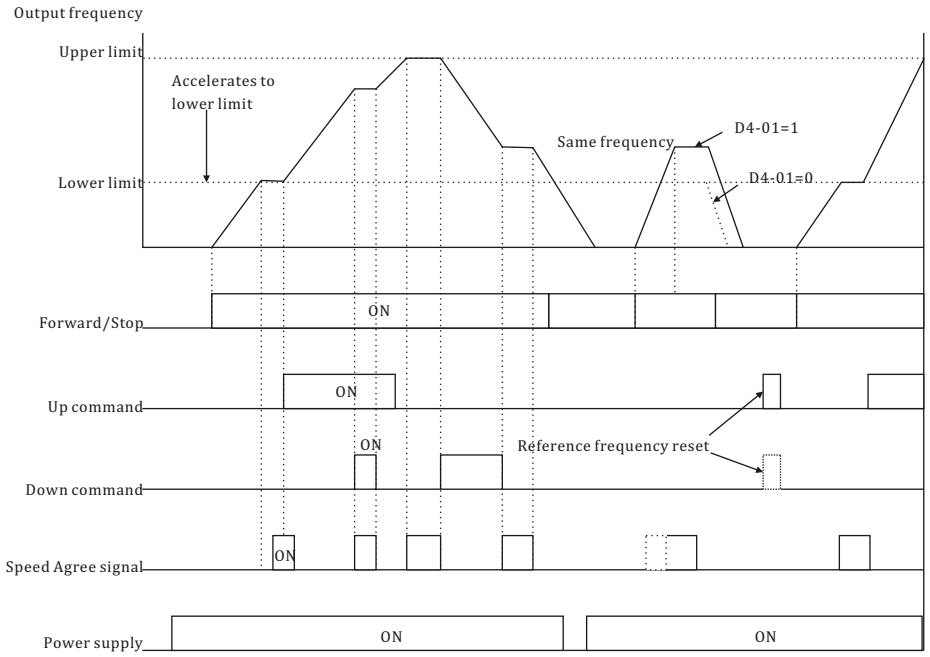
OFF	Operates with PI-control speed control loop.
ON	Operates with P-control speed control loop. (The speed control integral values are reset by the integral time constant.)

- This function is valid only for V/f control with PG feedback when constant F1-07 is set to 0. (Setting F1-07 to 0 disables integral operation during acceleration/deceleration.)
- It is possible to switch between these speed control modes during operation.

Up and Down Commands (Settings: 10 and 11)

Operation	Acceleration	Deceleration	Hold	Hold
Up command	ON	OFF	ON	OFF
Down command	OFF	ON	ON	OFF

- With these settings, the multi-function inputs can be used to control the Inverter's output frequency.
- When using this function, be sure to set both the up command (setting 10) and the down command(setting 11) for 2 multi-function inputs. An OPE03 option fault will occur if only one of these commands is set or if an acceleration/deceleration ramp hold input (setting A) is set at theBe sure to set constant b1-02 (the run command source selector) to 1 (external terminal). The up/down function won't operate with any other b1-02 setting.The frequency up/down commands operate according to the normal acceleration/deceleration times in C1-01 to C1-08.Upper limit = Maximum output frequency (E1-04) × Reference upper limit (d2-01) / 100The upper and lower limits for the output frequency with the up/down commands are determined by the following settings:Lower limit = Maximum output frequency (E1-04) × Reference lower limit (d2-02) / 100When frequency reference (voltage) terminal 13 or frequency reference (current) terminal 14 is beingused as a frequency reference input, the greatest frequency value becomes the lower limit (except when UP and DOWN are OFF, and run command is turned ON.)When the up/down function is being used, the output frequency will be accelerated to the lower limit if a run command is input.When the up/down function and jog frequency reference are both assigned to multi-function inputs, an ON jog frequency reference input has the highest priority.Multi-step speed references 1 to 8 are all disabled when the up/down function has been set.The output frequency held by the up/down function will be stored in memory if d4-01 (thefrequencyreference hold function selector) is set to 1. This output frequency will be retained even after a power loss, and operation will be restarted at this frequency the next time that a run command is input. Thestored output frequency will be cleared from memory if the up or down command is turned ON whilethe run command is OFF (see "Reference frequency reset" in Figure 7.36) .



The Speed Agree signal remains ON while the run command is ON and the motor isnot accelerating or decelerating.

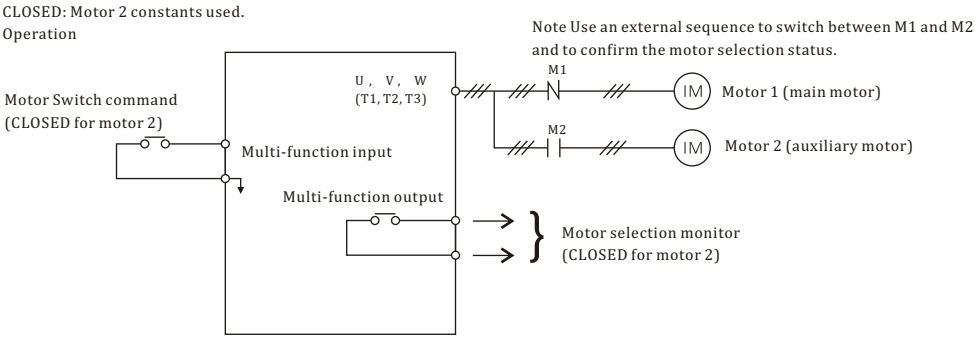
Timing Chart for Up and Down Commands

Fault Reset (Setting: 14)

OFF	Normal operation
ON	Resets faults when input goes from OFF to ON. (Normal operation when no fault has occurred.)

- With this setting, the multi-function input resets faults that have occurred.
- When a fault has occurred, be sure to find out what kind of fault occurred, take steps to correct the causeof the fault, and restart the Inverter. the Inverter by repeatedly resetting a fault without
- correcting the cause.To resume operation after a fault has occurred, turn the run command OFF, turn the fault reset inputfrom ON to OFF, and then turn the run cannot be reset while the run command
- is ON.If a fault hasn't occurred, turning the fault reset ON and OFF will have no effect on operation.

Motor Switch Command (Motor 2 Selection, Setting: 16)



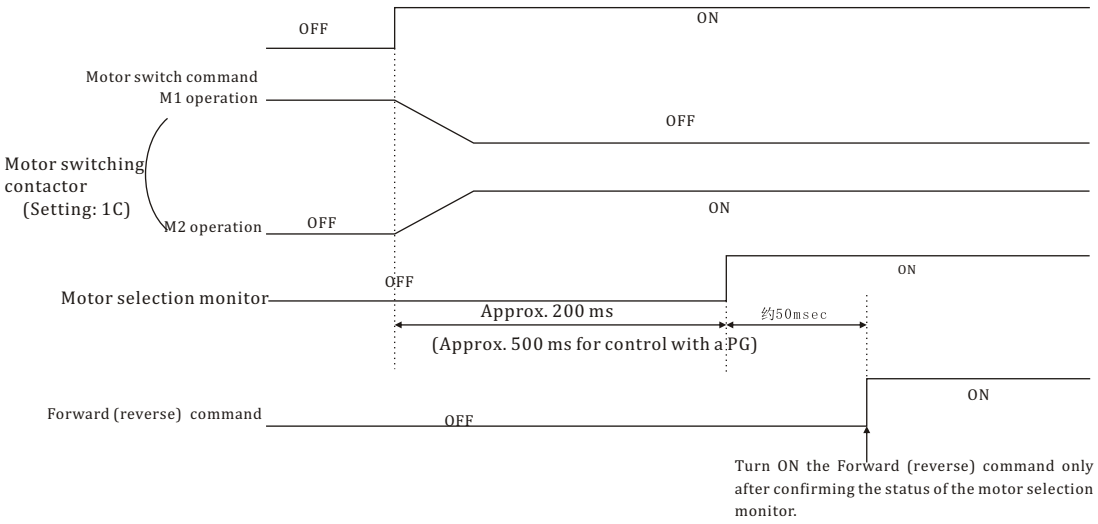
- The control method, V/f characteristics, and motor constants recorded in the Inverter can beswitched by setting "16" (motor switch command) for a constant from H1-01 to 06 (multi-function inputs), and then inputting a signal while the motor is stopped.
- The current motor selection can be monitored at a multi-function output terminal by setting "1C" (motor selection monitor) for a constant from H2-01 to 03 (multi-function outputs).

- Set the Basic (3) or Advanced (4) access level in the initialize setting A1-01 (access level).
- The constants being used will changed as shown in the following table for the motor switch command.

Motor Switch command	OPEN (motor 1)	CLOSED (motor 2)
Control method *	A1-02 (control method in initialize settings)	E3-01 (motor 2 control method)
V/f characteristics	E1-04 to 13 (V/f characteristics)	E4-01 to 07 (motor 2 V/f characteristics)
Motor constants	E2-01 to 09 (motor constants)	E5-01 to 06 (motor 2 motor constants)
Motor selection monitor	OPEN	CLOSED

→

- When A1-02≠E3-01, the constants under 8.2.9 are initialized each time the motor is switched.
The timing chart for switching between motor 1 and motor 2 is shown below.



Timing Chart for Switching from Motor 1 to Motor 2

PID Control Disable (Setting: 19)

OFF	Enables PID control.
ON	Disables PID control. (Normal Inverter control)

- With this setting, the multi-function input switches between PID control and normal Inverter control. This function can be used to perform trial operation or jog operation with normal inverter control (open-loop control) and then switch to PID control (closed-loop control using feedback) after adjusting the system. The PID disable function can also be used to switch to open-loop control when there is a problem with the feedback value.

Constants Write Enable (Setting: 1B)

OFF	Write-protects all constants except for frequency monitor.
ON	Allows constants specified in Initialize mode to be changed.

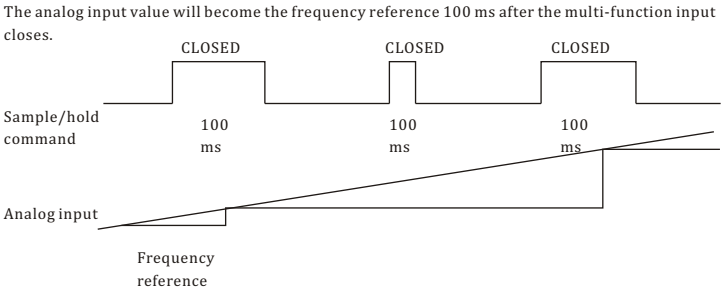
- With this setting, the multi-function input can be used to write-protect the Operator constants. When the input is OFF, the Operation mode frequency can be monitored and the frequency can be changed but other changes are prohibited.

Trim Control Increase and Decrease (Settings: 1C and 1D)

Output frequency	Reference frequency + trim control level (d4-02)	Reference frequency − trim control level (d4-02)	Reference frequency	Reference frequency
Trim Control Increase	ON	OFF	ON	OFF
Trim Control Decrease	OFF	ON	ON	OFF

- The trim control increase function adds the level in d4-02 to the analog frequency reference.
- The trim control decrease function subtracts the level in d4-02 to the analog frequency reference.
- These functions are effective when the frequency reference is input from an analog input. These functionsmust both be set at the same time or an OPE03 fault will occur. The analog frequency referencewon't be changed when both the trim control increase and decrease inputs are ON. The output frequency will be zero when the trim control decrease input is ON and the result of the subtraction is less than zero.

Analog Frequency Reference Sample/Hold (Setting: 1E)



Analog Frequency Reference Sample/Hold

- The analog frequency reference sample/hold function is valid only for terminals 13, 14, and 16 or for the analog inputs from the AI-14U or AI-14B.
- An OPE03 fault will occur if two or more of the following signals turn ON at the same time: acceleration/deceleration ramp hold command (0A), up/down commands (10 or 11), trim control increase/decreasecommands (1C or 1D), and the analog frequency reference sample/hold command.

External Faults (Settings: 20 to 2F)

- With this setting, the multi-function input can be used to stop the Inverter or output an alarm when a malfunction or fault occurs in a peripheral device.
- There are 16 external fault inputs available with all 16 combinations of the following variables. Select the setting with the desired combination.
- Input level: Normally open or normally closed
- Detection method: Always or During operation only
- Operation selection: Deceleration to stop, Coast to stop, Emergency stop, or Continue operation

External Fault Settings

Setting	Input level		Detection method		Operation selection			
	NO contact	NC contact	Always	During operation	Deceleration to stop (Fault)	Coast to stop (Fault)	Emergency stop (Fault)	Continue operation (Alarm)
20	○		○		○			
21		○	○		○			
22	○			○	○			
23		○		○	○			
24	○		○			○		
25		○	○			○		
26	○			○		○		
27		○		○		○		
28	○		○				○	
29		○	○				○	
2A	○			○			○	
2B		○		○			○	
2C	○		○					○
2D		○	○					○
2E	○			○				○
2F		○		○				○

- For the input level, select whether you want a fault to be detected when the input signal isON(normally open input) or OFF (normally closed input).For the detection method, select whether you want faults
- to be detected any time that the Inverter is ON or only during operation.

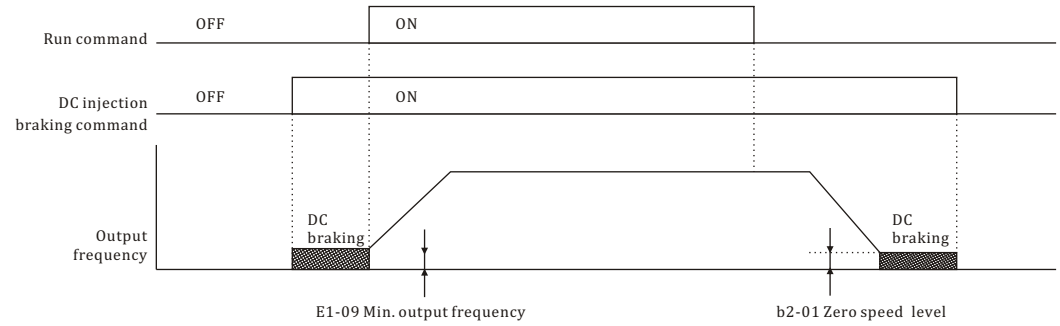
- For the operation selection, select the processing method that you want to be performed when a fault has been detected.
- Deceleration to stop: A fault is output and the output stopped in the selected deceleration time.
- Coast to stop: A fault is output and the Inverter output is cut off.
- Emergency stop: A fault is output and the output stopped in the emergency stop time (C1-09).
- Continue operation: An alarm is output and operation continues.
- When an alarm is going to be output externally, be sure to set one of the multi-function outputs (H2-01, 02, and 03) to alarm (setting 10).
- An external fault setting cannot be set in more than one multi-function input.
- Unlike other constant settings, the external fault settings have an input procedure, as shown in the following diagrams.

DC Injection Braking Command (Setting: 60)

OFF	Normal operation
ON	Applies DC injection braking if the Inverter is stopped. (Applies initial excitation when flux vector contro l is being used.)

- DC injection braking is used to prevent the motor from rotating due to inertia or external forces when the Inverter is stopped.
- DCinjection braking is performed if theDCinjection braking input isONwhile the Inverter is stopped.
- If a run command or jog command (jog, forward jog, or reverse jog) is input, the DC injection braking will be cleared and motor operation

will be started.



Timing Chart for DC Injection Braking Command

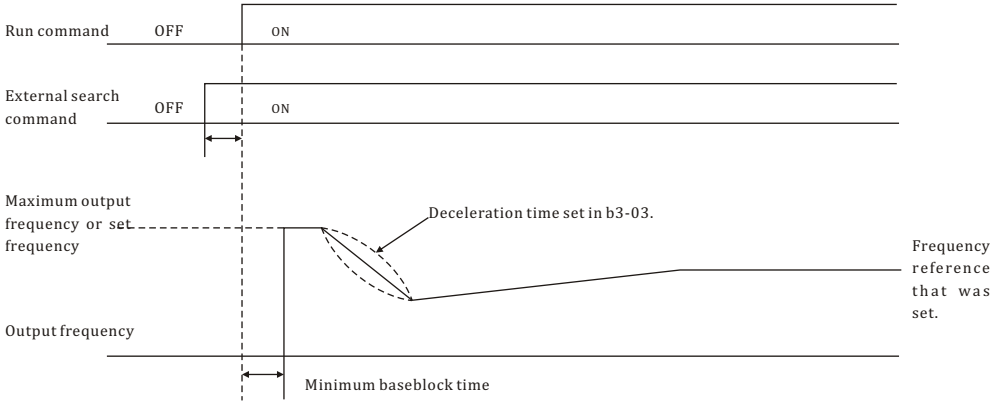
External Speed Search 1 (Settings: 61)

OFF	Normal operation
ON	Starts a speed search from the maximum output frequency.

External Speed Search 2 (Settings: 62)

OFF	Normal operation
ON	Starts a speed search from the set frequency (from the current reference frequency when the external search command turn ON).

- Either one of the external search functions can be set, but not both.
- The speed search function can be used to operate the motor without tripping when switching operation from a commercial power supply and the Inverter or starting a coasting motor.
- The speed search will begin after the minimum baseblock time (L2-03) has elapsed when the run command is input after the external search command has been turned ON.



Timing Chart for the External Search Command

Speed/Torque Control Change (Setting: 71)

OFF	Speed control
ON	Torque control

- With this setting, the multi-function input can be used to switch between speed and torque control. Refer to 7.3.4 Speed/Torque Control Switching Function for more details.

Zero-servo Command (Setting: 72)

OFF	Normal operation
ON	Zero-servo when the frequency (speed) reference falls below the zero-speed level in b2-01.

- With this setting, the multi-function input controls the zero-servo function (b9-01 and b9-02).
- When the zero-servo command is ON, a position control loop is formed and the motor is completelystopped when the frequency (speed) reference falls below the excitation level set in b2-01. Refer to7.3.2 Zero-servo Function for more details.

Speed Control (ASR) Proportional Gain Switch (Setting: 77)

OFF	The gain is set according to the values in C5-01, C5-03, and C5-07.
ON	The gain is set to the value in C5-03 (ASR proportional gain 2).

With this setting, the multi-function input switches the proportional gain used in speed control (ASR).The integral time is not changed.

5. 7. 2

H2-01 (Terminal 9 Sel) X B B B B

SettingRange

0~37 ★ [0]

Function

Multi-function input (terminal 9-10)

Description of choice

Refer to the following instructions

H2-02 (Terminal25 Sel) X B B B B

SettingRange

0~37 ★ [1]

Function

Multi-function input(terminal 25-27)

Description of choice

Refer to the following instructions

H2-03 (Terminal 26 Sel) X B B B B

SettingRange

0~37 ★ [2]

Function

Multi-function input terminal 26-27)

Description of choice

Refer to the following instructions

■ Multi-function Output Settings: H2

Multi-function Output Functions

Setting value	Function	Control Methods			
		V/f	V/f w / PG	Open loop Vector	Flux vector
0	During run (ON: run command is ON or voltage is being output)	○	○	○	○
1	Zero-speed	○	○	○	○
2	Frequency agree 1: (Detection width L4-02)	○	○	○	○
3	Desired frequency agree 1 (ON: Output frequency = ± L4-01, detection width in L4-02)	○	○	○	○
4	Frequency (Four) detection 1 (ON: +L4-01 ≥ output frequency ≥ −L4-01, detection width in L4-02)	○	○	○	○
5	Frequency (Four) detection 2 (ON: Output frequency ≥ +L4-01 or output frequency ≤ −L4-01, detection width in L4-02)	○	○	○	○
6	Inverter operation ready READY: After initialization, no faults	○	○	○	○
7	During DC bus undervoltage (UV) detection	○	○	○	○
8	During baseblock (ON: during baseblock)	○	○	○	○
9	Frequency reference selection (ON: Frequency reference from Operator)	○	○	○	○
A	Run command selection (ON: Run command from Operator)	○	○	○	○
B	Overtorque detection 1 NO (NO contact: Overtorque detection at ON)	○	○	○	○
C	Loss of frequency reference (Effective when operation selection is "1" for L4-05 frequency reference missing)	○	○	○	○
D	Braking resistor fault (ON: Resistor overheat or braking transistor fault)	○	○	○	○
E	Fault (ON: Faults other than CPF00, CPF01 have occurred.)	○	○	○	○
F	Not used.	—	—	—	—
10	Minor fault (ON: Alarm displayed)	○	○	○	○
11	Fault reset command active	○	○	○	○
12	Timer function output	○	○	○	○
13	Frequency agree 2 (Detection width: L4-04)	○	○	○	○
14	Desired frequency agree 2 (ON: Output frequency = L4-03, detection width in L4-04)	○	○	○	○
15	Frequency detection 3 (ON: Output frequency ≤ −L4-03, detection width in L4-04)	○	○	○	○
16	Frequency detection 4 (ON: Output frequency ≥ −L4-03, detection width in L4-04)	○	○	○	○
17	Overtorque detection 1 NC (NC Contact: Torque detection at OFF)	○	○	○	○
18	Overtorque detection 2 NO (NO Contact: Torque detection at ON)	○	○	○	○
19	Overtorque detection 2 NC (NC Contact: Torque detection at OFF)	○	○	○	○
1A	During reverse run (ON: During reverse run)	○	○	○	○
1B	During baseblock 2 (OFF: During baseblock)	○	○	○	○
1C	Motor selection (Motor under selection)	○	○	○	○
1D	Regenerating (ON: Regenerating)	X	X	X	○
1E	Restart enabled (ON: Restart enabled)	○	○	○	○
1F	Motor overload (OL1) pre-alarm (ON: 90% or more of the detection level)	○	○	○	○
20	Inverter overheat (OH) pre-alarm (ON: Temperature exceeds L8-02 setting)	○	○	○	○
30	During torque limit (current limit) (ON: During torque limit)	X	X	○	○
31	During speed reference limit. (ON: During speed reference limit)	X	X	X	○
33	Zero-servo end (ON: Zero-servo function completed)	X	X	X	○
37	During run 2 (ON: Frequency output, OFF: Base block, DC injection braking, initial excitation, operation stop.	○	○	○	○

Constant Settings

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f Control	V/f with PG	Open Loop Vector	Flux Vector
H2-01	Multi-function input (terminal 9-10)	×	0 to 37	–	0	B	B	B	B
H2-02	Multi-function input (terminal 25)	×	0 to 37	–	1	B	B	B	B
H2-03	Multi-function input (terminal 26)	×	0 to 37	–	2	B	B	B	B

The following table shows the settings and section references for functions that are described in more detail in this chapter.

Function	Setting	Section
Frequency Agree 1	2	Frequency DetectionSettings: L4-01toL4-05in L4 to L4 in 7.5.6
Desired Frequency Agree 1	3	
Frequency Detection 1	4	
Frequency Detection 2	5	
Overtorque Detection 1 (NO)	B	Overtorque Detection Settings: L6-01 to L6-06 in 7.5.6
Loss of Frequency Reference	C	Timer Functions: b4 01 b4 02 in 7 5 1
Timer Function Output	12	
Frequency Agree 2	13	Frequency DetectionSettings: L4-01 to L4-05 in 7.5.6
Desired Frequency Agree 2	14	
Frequency Detection 3	15	
Frequency Detection 4	16	
Overtorque Detection 1 (NC)	17	Overtorque Detection Settings: L6-01 to L6-06 in 7.5.6
Overtorque Detection 2 (NO)	18	
Overtorque Detection 2 (NC)	19	

Refer to Table 7.10 Multi-function Output Functions for information on the following functions.

Function	Setting
Inverter Operation Ready	6
DC Bus Undervoltage	7
During Baseblock	8
Frequency Reference Selection	9
Run Command Selection	A
Braking Resistor Fault	D
Fault	E
Minor Fault	10
Fault Reset Command Active	11
During Reverse Run	1A
During Baseblock 2	1B
Regenerating	1D
Restart Enabled	1E
During Torque Limit (Current Limit)	30
During Speed Limit	31

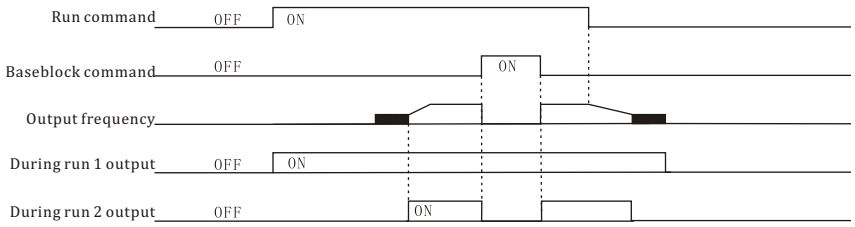
During Run (Setting: 0)

OFF	The run command is OFF and there is not output voltage.
ON	The run command is ON or a voltage is being output.

During Run 2 (Setting: 37)

OFF	The Inverter is not outputting a frequency. (Baseblock, DC injection braking, initial excitation, or stopped)
ON	The Inverter is outputting a frequency.

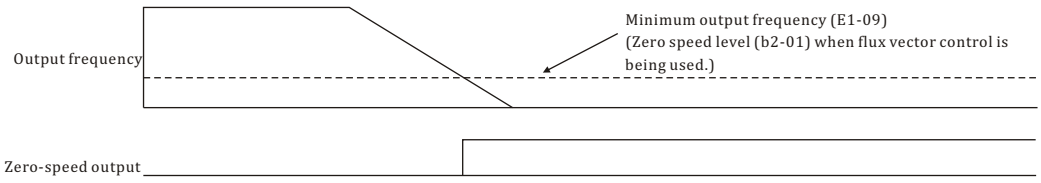
•These outputs can be used to indicate the Inverter's operating status.



Timing Chart for "During RUN" Output

Zero-speed (Setting: 1)

OFF	The output frequency is greater than the minimum output frequency (E1-09). (With flux vector control, is greater than the zero speed level (b2-01).)
ON	The output frequency is less than the minimum output frequency (E1-09). (With flux vector control, is less than the zero speed level (b2-01).)



Timing Chart for Zero-speed

Motor Overload (OL1) Pre-alarm (Setting: 1F)

OFF	The motor protection function's electronic thermal value is less than 90% of the detection level.
ON	The motor protection function's electronic thermal value is greater than 90% of the detection level.

- This output function is valid when the motor overload protection function is enabled (L1-01 =1).
- This output can be used to warn of overheating before the protection function itself operates.

Inverter Overheat (OH) Pre-alarm (Setting: 20)

OFF	The cooling fin temperature is less than the "OH Pre-Alarm Level" set in L8-02.
ON	The cooling fin temperature exceeds the "OH Pre-Alarm Level" set in L8-02.

Zero-servo End (Setting: 33)

OFF	The zero-servo command isn't being input or zero-servo position control hasn't been completed.
ON	The position has been brought within the zero servo completion width (b9-02) after the zeroservo command was input.

- This output function indicates that zero-servo position control has been completed.
- The output is turnedONafter the zero-servo command is input and the difference between the zero-servo operation starting position and the current position is within the zero servo completion width (b9-02).

5.7.3 Multi-function Analog Input: H3

H3-01 (Term 13 Segnal) X B B B B

SettingRange

0~+10V ★[0]
-10~+10V [1]

Function

Signal level selection (terminal 13)

Description of choice

The frequency reference (voltage) is valid when constant b1-01 has been set to 1.

H3-02 (Term 13 Gain) 0 B B B B

SettingRange

0.0~1000.0 ★[100.0]

Function

A 10 V (20 mA) input indicates a frequency reference that is100% of the max. output frequency.

Description of choice

Refer to the following adjustment of analog input

H3-03 (Term 13 Biss) 0 B B B B

SettingRange

-100.00~+100.0 ★[0.0]

Function

Sets the frequency when 0 V is inputas a percentage of the maxi put,maximum frequency.

Description of choice

Refer to the following adjustment of analog input

H3-04 (Term 16 Sel Segnal)X B B B B

SettingRange

0~+10V ★[0]
-10~+10V [1]

Function

Set the signal level for the multi-function analog input.

Description of choice

Description of settings

Setting	Function
0	0 to 10 VDC input [11-bit + polarity (positive/ negative) input]
1	-10 to 10 VDC input(A negative voltage is a reference for reverse rotation.)

H3-05 (Term 16 Sel) X B B B B

SettingRange

0~1F ★[0]

Function

Multi-function analog input (terminal 16)

Description of choice

The analog input signal level, gain, and bias are set with the following constants.When a voltage input is being input to terminal 14, be sure to disconnect jumper wire J1 on the controlPC board.

Set the time constant in constant H3-12 when adding a primary delay filter to an analog input. Thisfilter time constant applies to all three of the analog inputs.Settings 2 and D cannot be set at the same time. OPE07 will be detected.

Terminal 16 signal level selector	H3-04 (0 to +10 V or 0 to ±10 V)
Terminal 16 input gain	H3-06
Terminal 16 input bias	H3-07
Terminal 14 signal level selector	H3-08 (0 to +10 V, 0 to ±10 V, or 4 to 20 mA)
Terminal 14 input gain	H3-10
Terminal 14 input bias	H3-11

Multi-function Input/Frequency Reference (Voltage) Function

Setting	Function	Equivalent of 100% Input (10 V or 20 mA)	Control Method			
			V/f	V/f w/ PG	Open -loop Vector	Flux Vector
0	Auxiliary frequency reference (H3-05)	Maximum output frequency	○	○	○	○
1	Frequency gain	Frequency reference (voltage) command value	○	○	○	○
2	Frequency bias (zero-limited when the rotation directionchanges)	Maximum output frequency (added to H3-03)	○	○	○	○
4	Voltage bias	Motor rated voltage (E1-05)	○	○	X	X
5	Accel/Decel change (reduction coefficient)	Accel/Decel times (C1-01 to C1-08)	○	○	○	○
6	DC injection braking current	Inverter rated output current	○	○	○	X
7	Overtorque detection level	Motor rated torque	○	○	○	○
8	Stall prevention level during run	Inverter rated output current	○	○	X	X
9	Frequency reference lower limit level	Maximum output frequency	○	○	○	○
A	Jump frequency	Maximum output frequency	○	○	○	○
B	PID feedback	Maximum output frequency	○	○	○	○
C	PID target value	Maximum output frequency				
D	Frequency bias	Maximum output frequency (Added to the H3-03 value)				
10	Forward side torque limit	**Motor rated torque**	X	X	○	○
11	Reverse side torque limit	Motor rated torque	X	X	○	○
12	Regeneration for torque limit		X	X	○	○
13	Torque reference/torque limit for speed control	Motor rated torque	X	X	X	○
14	Torque compensation	Motor rated torque	X	X	X	○
15	Forward/reverse torque limit	Motor rated torque	X	X	○	○
	Disable analog input (H3-05)	—	○	○	○	○
1F	Refer to 12.6 Function Block Diagram for details. Frequency Reference (H3-09)	Maximum output frequency	○	○	○	○

H3-06 (Term 16 Gain) O B B B B

SettingRange

0.0~1000.0 ★[100.0]

Function

Sets the input gain (level) whenterminal 16 is 10 V.Set according to the 100% value

Description of choice

Refer to the following adjustment of analog input

H3-07 (Term 16 Blas) O B B B B

SettingRange

-100.0~+100.0 ★[0.0]

Function

Sets the input gain (level) when terminal 16 is 0 V.Set according to the 100% value

Description of choice

Refer to the following adjustment of analog input

H3-08 (Term 14 Sel) X A A A A

SettingRange

0~+10V [0]

0~±10V [1]

4~+20mA ★[2]

Function

Signal level selection (terminal 14)

Description of choice

The frequency reference (current) is valid when constant b1-01 has been set to 1.

Set the signal level for the frequency reference (current).

Setting	Function
0	0 to 10 VDC input (10-bit input)
1	-10 to 10 VDC input (A negative voltage is a reference for reverse rotation.)
2	4 to 20 mA input

When the terminal is being used as a voltage input terminal (setting 0 or 1), jumper J1 must be disconnectedon the control board. (See Figure 6.1.) The terminal's input resistor will be destroyed if the terminalis used for a voltage input with jumper J1 connected.When frequency references are being input simultaneously from both the voltage terminal 13 and thecurrent terminal 14, the final reference value will be the sum of the two references that are input.To switch the frequency reference input between the voltage terminal 13 and the current terminal 14 ,set a value of 1F in any one of the multi-function inputs (H1-01 through H1-06).The voltage terminal 13 will be used when this multi-function input is OFF and the current terminal14 will be used when this multi-function input is ON.If a 0 to ±10 VDC input is set, H3-01 must also be set to a 0 to ±10 VDC input.

H3-09 (Term 14 Sel) X A A A A

SettingRange

0~1F ★[1F]

Function

Gain (terminal 14)

Description of choice

Reference H3-05 Description

H3-10 (terminall4 Gain) O A A A A

SettingRange

0.0~1000.0 ★[100]

Function

Sets the input gain (level) whenterminal 14 is 10 V (20 mA).Set according to the 100% value

Description of choice

Refer to the following adjustment of analog input

H3-11(Terminall 4 Blas)O A A A A

SettingRange

-100.0~+100.0 ★[0.0]

Function

Sets the input gain (level) whenterminal 14 is 0 V (4 mA). Set according to the 100% value

Description of choice

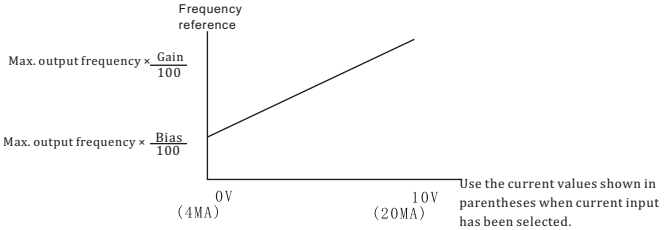
There are three constants used to adjust the analog inputs: The gain, bias (both set separately for eachinput), and filter time constant (a single value for all of the inputs).

• The gain and bias can be adjusted separately for each analog input (terminals 13, 14, and 16).

Gain: Set the frequency corresponding to a 10 V (20 mA) input as a percentage of themaximum frequency. (The maximum output frequency set in E1-04 is 100%.)

Bias: Set the frequency corresponding to a 0 V (4 mA) input as a percentage of themaximum frequency. (The maximum output frequency set in E1-04 is 100%.)

• Set the gains and biases for terminals 13, 14, and 16 as follows:



增益与偏置

H3-12 (Filter Avg Time) X A A A A

SettingRange

0.00~2.00 ★[0.00]

Function

Sets terminals 13, 14, 16 to primary delay filter time constant, in seconds units

Description of choice

A primary delay digital filter can be set for all three analog inputs (frequency reference (voltage), frequencyreference (current), and multi-function analog input)This setting is effective when there are sudden changes or noise in the analog input signal.Responsiveness decreases as the setting increases.

5. 7. 4Analog Outputs: H4

H4-01 (Terminal 21 Sel) X B B B B

SettingRange

1~38 ★[2]

Function

Sets the number of the monitor item to be output (U1-jj) from terminal 2

Description of choice

The multi-function outputs can be set to monitor any of the U1 Inverter status items by setting the lasttwo digits of the constant number (U1-jj).Refer to page 4 - 12 for a table listing all of these U1 settings.
Settings 4, 10, 11, 12, 13, 14, 25, 28, 34 and 35 can't be set and
settings 29, 30, and 31 aren't used.

H4-02 (Terminal 21 Gain) 0 B B B B

SettingRange

0.00~2.50 ★ [1.00]

Function

Sets the multi-function analog output 1 voltage level gain.
Sets whether the monitor itemoutput will be output in multiples of 10 V.

H4-03 (Terminal 21 Bias) 0 B B B B

SettingRange

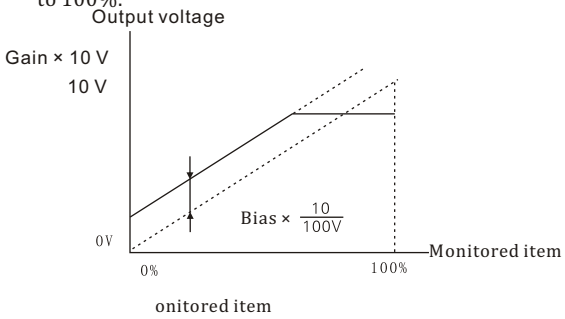
-10.0~+10.0 ★ [0.0]

Function

Sets the multi-function analogoutput 1 voltage level bias.
Sets output characteristic up/downparallel movement as a percentage of 10 V.

Description of choice

For the output gain, set what multiple of 10 V will correspond to a 100% output of the monitored item.
For the output bias, set the amount that the output characteristic will be shifted vertically.
Set this amount as a percentage, with 10 V corresponding to 100%.



onitored item

H4-04 (Terminal 23 Sel) X B B B B

SettingRange

1~38 ★ [3]

Function

Sets the number of the monitoritem to be output (U1-jj) fromterminal 23.

Description of choice

Reference H4-01 Description

H4-05 (Terminal 23 Gain) 0 B B B B

SettingRange

0.00~2.50 ★ [0.05]

Function

Sets the multi-function analogoutput 2 voltage level gain.
Sets whether the monitor itemoutput will be output in multiples of 10 V.

Description of choice

Reference H4-02 Description

H4-06 (Terminal 23 Bias) 0 B B B B

SettingRange

-10.0~+10.0 ★ [0.0]

Function

Sets the multi-function analog
Sets output characteristic up/downparallel movement as a percentage of 10 V.

Description of choice

Reference H4-03 Description

H4-07 (Ao Level Select) X B B B B

SettingRange

0 to +10 V output ★ [0]
0 to 10 V +output [1]

Function

Sets the signal output level formulti-function outputs 1 and 2 (terminals 21, 23.)

Description of choice

This signal level setting applies to analog outputs 1 and 2 (terminals 21 and 23). When the 0 to ±10Vsignal level is used to output speed values (frequency reference, output frequency,or motor speed), positive voltage indicates Inverter output in the forward direction and negative voltageindicates Inverter output in the reverse direction. (Assuming a bias setting of 0.0.) There are some monitor items that are limited to the 0 to +10 V sign al range even when the 0 to ±10 Vsignal level has been selected.

Setting	Function
0	0~+10V Absolute value output
1	0~±10V

5. 7. 5MEMOBUS Communications: H5

H5-01 (Serial Comm Adr) X A A A A

SettingRange

0~20 ★ [1F]

Function

Set the Inverter's node address

H5-02 (Serial Com Sel) X A A A A

SettingRange

1200Baud [0]
2400Baud [1]
4800Baud [2]
9600Baud ★ [3]
19200Baud [4]

Function

Set the baud rate for 6CN MEMOBUS communications.

H5-03 (Serial Com Sel) X A A A A

SettingRange

No parity ★ [0]
Even parity [1]
Odd parity [2]

Function

Set the parity for 6CN MEMOBUScommunications.

H5-04 (Serial Fault Sel) X A A A A

SettingRange

Deceleration stop [0]
Coast to stop [1]
Emergency stop [2]
Continue operation ★ [3]

Function

Set the stopping method for communications errors.

H5-05 (Send timeout detected)	X	A	A	A	A

SettingRange

Do not detect.	[0]
Detect	★ [1]

Function

Set whether or not a communications timeout is to be detected as acommunications error.

5. 8Protection Constants: L

5. 8. 1Motor Overload: L1

L1-01(Mol Fault Select)	X	B	B	B	B

SettingRange

Disabled	[0]
Enabled	★ [1]

Function

Sets whether the motor overloadfunction is enabled or disabled at electric thermal overload relay.

Description of choice

The rated current setting (E2-01) is used as a basis for overload detection.Disable the motor protection function (setting 0) when two or more motors are connected to a singleInverter. Use another method to provide overload protection separately to each motor, such as connectinga thermal overload relay to the power line of each motor. The motor protection function may not protect a motor when the power supply is turned ON and OFFfrequently, because the thermal value is reset each time that the power is turned OFF.If the Overload OL1 alarm (1F) is set in one of the multi-function outputs (H2-01 to H2-03), the outputwill be turned ON when the electronic thermal value reaches 90% of the overload detection level.

L1-02 (Mol Time Const)	X	B	B	B	B

SettingRange

0.1~5.0	★ [1.0]

Function

Sets the electric thermal detection time in seconds units.

Description of choice

Normally it isn't necessary to change this setting. (The factory setting is a 150%, 1 minute capacity.) Set the electronic thermal protection operation time if a 150% overload is applied after operating continuouslyat the motor's rated current (hot start). When the motor's overload capacity level is known, set the hot-start overload resistance level for the motor, but be sure to allow some margin for safety .Decrease this setting when you want to detect an overload more quickly.

5. 8. 2Power Loss Ridethrough: L2

L2-01 (Pwrl Selection)	X	B	B	B	B

SettingRange

Disabled	★ [0]
Enabled	[1]
Enabled while CPU is operating	[2]

Function

This constant specifies the processing that is performed when a momentary power loss occurs.

Description of choice

When power loss ridethru is enabled (setting 1 or 2), operation will be restarted after a speed searchif the power is restored within the allowed time interval.When power loss ridethru is disabled (setting 0), an undervoltage fault will be detected if power is interruptedfor more than 15 ms.

L2-02 (Pwrl Ridethru t)	X	B	B	B	B

SettingRange

0.0~2.0	★ [2.0]

Function

Sets the recovery time, when momentarypower loss selection(L2 01) is set to 1 in units of one L2-1, second.

Description of choice

This setting is valid only when constant L2-01 is set to 1 . Set the power loss ridethru time in seconds.

L2-03 (Pwrl Baseblock t)	X	B	B	B	B

SettingRange

0.1~5.0	★ [0.5]

Function

Sets the Inverter's minimum baseblocktime in units of one second,when the Inverter is restarted after power loss ridethrough.

Description of choice

This setting is used with the speed search and DC injection braking functions.
Set the time required for the leakage voltage to dissipate. Increase the setting if an overcurrent (OC) occurs when the speed search or DC injection braking function starts.This setting is valid for speed searches performed after a momentary power loss and regular speedsearches.

L2-04 (Pwrl V/F Ramp T)	X	A	A	A	A

SettingRange

0.0~5.0	★ [0.3]

Function

Sets the time required to return to normal voltage at the completionof a speed search, in units of onesecond.

Description of choice

Set the time allowed for the normal voltage to be restored after completion of the speed search.For a 200Vclass Inverter, this is the time in seconds for voltage to be restored from 0VACto 200VAC. For a 400Vclass Inverter, this is the time in seconds for voltage to be restored from 0VACto 400VAC.This setting is valid for speed searches after a momentary power loss, regular speed searches, the voltagechanges with energy-saving control, and the voltage changes with baseblock clearing.

L2-05 (PUV Det Level)	X	A	A	A	A

SettingRange

130~420	★ [380]

Function

Sets the main circuit under voltage(UV) detection level (maincircuit DC voltage) in V units.

Description of choice

The values in parentheses are for 400 V class Inverters. Normally it isn't necessary to change this setting. Use this constant when you want to add an AC reactor and lower th e main circuit undervoltage detectionlevel. Be sure to set a main circuit DC voltage value (V) that will detect a main circuit undervoltage.

L2-06 (KEB Frequency)	X	A	A	A	A

SettingRange

0.0~100.0	★ [0.0]

Function

Restores the operating conditionsfor momentary power loss by applyinga frequency deceleration toplying create inertia energy when a powerloss occurs, and thus avoid the power loss.

Description of choice

This function is normally used with film lines and other applications where multiple Inverters are connectedto the main DC line. Synchronous deceleration for power loss prevents the line from stoppingas the result of speed fluctuations.The KEB operation is performed using a KEB command (setting of 65 or 66) for a multi-function input.400 V class Inverters: 0.4 to 18.5 kW

5. 8. 3Stall Prevention: L3

L3-01 (Staiip Accel Sel) X B B B X

SettingRange

Disabled	★ [0]
Enabled	[1]
Intelligent acceleration mode	[2]

Stall prevention selection during accel

Description of choice

Astall occurs if the rotor cannot keep up with the rotating magnetic field on the motor stator side whena large load is applied to the motor or a sudden acceleration/deceleration is performed.In the Inverter, stall prevention functions can be set independently for accelerating, running, and decelerating. (Some functions are restricted depending on the control method.)When setting 1 (enabled) is selected, acceleration is stopped if the motor current exceeds the accelerationstall prevention level. Acceleration is started again when the current falls below this level. The acceleration time can be longer than the setting depending on the load.When setting 2 (optimum acceleration) is selected, acceleration is performed using the accelerationstall prevention level as a basis. In this case, the acceleration time is disregarded.

L3-02 (Staiip Accel Lv1)X B B B X

SettingRange

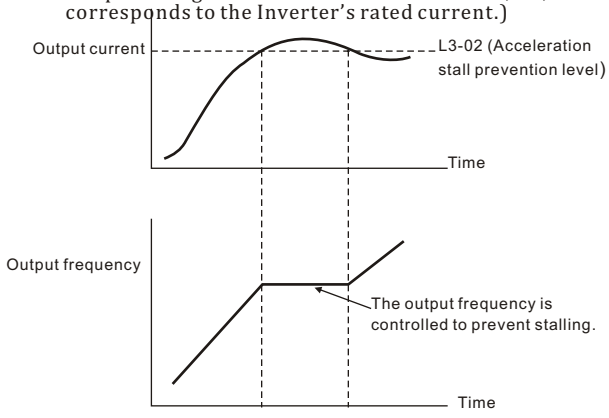
0~200 ★ [150]

Function

Effective when L3-01 is set to 1 or2.Set as a percentage of Inverter rated current.

Description of choice

This setting is valid when L3-01 is set to 1 or 2.Normally it isn't necessary to change this setting.Decrease this setting when the motor capacity is small compared to the Inverter capacity or stallingoccurs when the motor is operated with the factory setting. The standard target setting is 2 to 3 timesthe motor's rated current.(Set this current value as a percentage of the Inverter's rated current, i.e.,100% corresponds to the Inverter's rated current.)



Acceleration Stall Prevention Function: L3-01 = 1

L3-03 (Staiip Chp Lv1) X A A A X

SettingRange

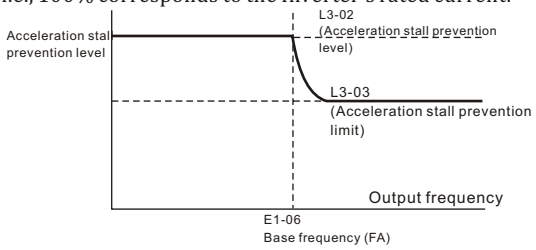
0~100 ★ [50]

Function

Sets the lower limit for stall prevention during acceleration, as apercentage of the Inverter ratedcurrent, when operation is in thefrequency range above the maximum voltage frequency

Description of choice

Sets the lower limit for stall preventionNormally it isn't necessary to change this setting.Set this constant when a high-speed motor is being used in the high-speed range (the high frequencyrange above the base frequency).The standard target setting is the motor's rated current. Set this current value as a percentage of theInverter's rated current , i.e., 100% corresponds to the Inverter's rated current.



Note When the motor is used in the high-speed range, the acceleration stall prevention levelis automatically lowered to provide smoother Acceleration.The acceleration stall prevention limit (L3-03) limits how much the acceleration stallprevention level is lowered so that it isn't lowered any more than necessary.

L3-04 (Staiip Dccel Sel)X B B B B

SettingRange

Disabled	[0]
Enabled	★ [1]
Intelligent deceleration mode	[2]
Enabled	[3]

Function

Stall prevention selection during decel

Description of choice

When setting 1 (enabled) is selected, the deceleration time is extended automatically so that a maincircuit overvoltage doesn't occur.Always select setting 0 or 3 when a braking option (Braking Resistor, Braking Resistor Unit, or BrakingUnit) is being used.

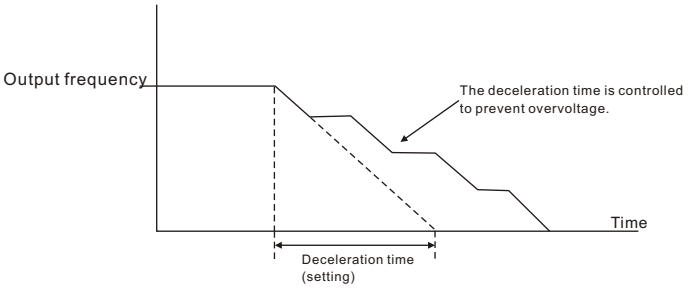
Stall Prevention Selection During Decel: L3-04

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f Control	V/f with PG	Open Loop Vector	Flux Vector
L3-04	Stall prevention selection during decel	X	0~3	—	1	B	B	B	B

Settings

Setting	Function
0	Disabled. (Decelerate according to the settings. Main circuit overvoltage may occur if the deceleration time is too short.)
1	Enabled. (Stops deceleration if the main circuit voltage exceeds the overvoltage level. Decelerate again when voltage recovers.)
2	Optimum deceleration. (Decelerate as fast as possible judging from the main circuit voltage. Disregard the deceleration time setting.)
3	Enabled (with braking resistor)

If setting 1 or 2 is selected, the braking option won't be used and the decelerationtime can't be shortened.L3-04 cannot be set to 2 for open-loop vector control mode. (Settings can be made for SPEC:F andlater)L3-04=3 cannot be set in open-loop vector controlmode.



Deceleration Stall Prevention Function: L3-04 = 1

L3-05 (Stallp run sel) X B B X X

SettingRange

Disabled. [0]
Enabled -deceleration time 1. ★ [1]
Enabled -deceleration time 2. [2]

Function

Stall prevention selection during running

Description of choice

When setting 1 or 2 (enabled) is selected, deceleration is started if the current of the stall preventionlevel during operation continues for more than 100 ms. The motor is accelerated back to the referencefrequency again when the current falls below this level.

L3-06 (Stallp Run Level) X B B X X

SettingRange

30～200 ★ [160]

Function

Effective when L3-05 is 1 or 2. Set as a percentage of the Inverterrated current.

Description of choice

Usually setting is not necessary necessary.The factory setting reduces theset values when the motor stalls.

5. 8. 4Reference Detection: L4

L4-01 (Spd Agree Level) X B B B B

SettingRange

0.0～400.0 ★ [0.0]

Function

Set these constants when outputting one of the frequency agree or frequency detection signals froma multi-function output.

Description of choice

In the multi-function output, the same frequency, any frequency the same, such as the frequency detection signal output setting. Vector control with PG the occasion, the output motor speed

L4-02 (Spd Agree Width) X B B B B

SettingRange

0.0～20.0 ★ [2.0]

Function

Set these constants when outputting one of the frequency agre or frequency detection signals froma multi-function output.

L4-03 (Spd Agree Lv1 +-) X A A A A

SettingRange

－400.0～＋400.0 ★ [0.0]

Function

In the multi-function output, set "an arbitrary frequency (speed) line 2)"

L4-04(Spd agree width +-)X A A A A

SettingRange

0.0～20.0 ★ [2.0]

Function

In the multi-function output, set "an arbitrary frequency (speed) line 2)"

User Constant Number	Name	Change during Operation	Setting Range	Unit	Factory Setting	Valid Access Levels			
						V/f Control	V/f with PG	Open Loop Vector	Flux Vector
L4-01	Speed agree detection level	X	0.0~400.0	Hz	0.0	B	B	B	B
L4-02	Speed agree detection width	X	0.0~20.0	Hz	2.0	B	B	B	B
L4-03	Speed agree detection level (+/-)	X	-400.0~ +400.0	Hz	0.0	A	A	A	A
L4-04	Speed agree detection width (+/-)	X	0.0~20.0	Hz	2.0	A	A	A	A

L4-05 (RefLoss Sel) X A A A A

SettingRange

Stop ★ [0]
Continue operation at 80% speed. [1]

Function

Frequency of detection of movement

Description of choice

The frequency reference is considered lost when the frequency reference voltage drops by 90% formore than 400 ms.

5. 8. 5Fault Restart: L5

L5-01 (Num Of Restarts) X B B B B

SettingRange

0～10 ★ [0]

Function

Sets the number of auto restart attempts.Automatically restarts after a faultand conducts a speed search from the run frequency.

Description of choice

The fault restart function automatically restarts the Inverter even when an internal fault occurs duringInverter operation. Use this function only when continuing operation is more important than possiblydamaging the Inverter.The fault restart function is effective with the following faults.With other faults, the protective operationswill engage immediately without attempting to restart operation.

S OC (Overcurrent) S PF (Main circuit voltage fault) S OL1 (Motor overload)S GF (Ground fault) S LF (Output open-phase) S OL2 (Inverter overload)S PUF (Fuse blown) S RF (Braking resistor overheated)S OL3 (Overtorque)S OV (Main circuit overvoltage) S RR (Braking transistor fault) S OL4 (Overtorque)S UV1 (Main circuit undervoltage)The fault restart count is cleared in the following cases:• When operation is normal for 10 minutes after a fault restart is performed.• When the fault reset input is received after the protection operation has been activated and the fault confirmed.• When the power is turned OFF and then ON again.When one of the multi-function outputs (H2-01, H2-02, or H2-03) is set to 1E (Restart Enabled), theoutput will be ON while the fault restart function is in progress.

L5-02 (Restart Sel)	X	B	B	B	B

SettingRange

Not output ★ [0]
Output [1]

Function

Sets whether a fault contact output is activated during fault restart.

5. 8. 6Torque Detection: L6

L6-01 (Torq Det 1 Sel)	X	B	B	B	B

SettingRange

Overtorque detection disabled. ★ [0]
Detection during speed agreeonly/Operation continues afterdetection [1]
Detection during run/Operationcontinues after detection Minor [2]
Detection during speed agreeonly/Inverter output is shut offafter detection [3]
Detection during run/Inverteroutput is shut off after detection [4]

Function

Torque detection selection

Description of choice

0: Overtorque detection disabled.
1: Detection during speed agreeonly/Operation continues afterdetection (Minor fault)
2: Detection during run/Operationcontinues after detection(Minor fault)
3: Detection during speed agreeonly/Inverter output is shut after detection (Fault)
4: Detection during run/Inverteroutput is shut off after detection(Fault)

L6-02 (Torq Det1 Lv1)	X	B	B	B	B

SettingRange

0~300 ★ [150]

Function

Vector control: Motor rated torqueis set as 100%.V/f control: Inverter rated currentis set as 100%.

Description of choice

Refer to instructions

L6-03 (Torq Det 1Time)	X	B	B	B	B

SettingRange

0.0~10.0 ★ [0.1]

Function

Sets the torque detection time in1 second units 1-units.

Description of choice

Refer to instructions

L6-04 (Torq Det 2 Sel)	X	A	A	A	A

SettingRange

0~4 ★ [0]

Function

Setting procedure is the same asfor “Torque detection selection 1” (L6 01 L6 03)Torque detection selection 1:Multi-function output “Torquedetection selection 1” NO/NCTorque detection selection 2:Multi-function output “Torquedetection selection 2” NO/NC

Description of choice

Refer to instructions

L6-05 (Torq Det 2 Lv1)	X	A	A	A	A

SettingRange

0~300 ★ [150]

Function

Setting procedure is the same asfor “Torque detection selection 1”(L6 01 L6 03)Torque detection selection 1:Multi-function output “Torquedetection selection 1” NO/NCTorque detection selection 2:Multi-function output “Torquedetection selection 2” NO/NC

Description of choice

Refer to instructions

L6-06 (Torq Det 2 Time)	X	A	A	A	A

SettingRange

0.0~10.0 ★ [0.1]

Function

Setting procedure is the same asfor “Torque detection selection 1”(L6 01 L6 03)Torque detection selection 1:Multi-function output “Torquedetection selection 1” NO/NCTorque detection selection 2:Multi-function output “Torquedetection selection 2” NO/NC

Description of choice

The overtorque detection function detects an excessive mechanical load from an increase in the outputcurrent (or output torque). The settings in the torque detection selection constants(L6-01 and L6-04) determine whether overtorqueconditions will be detected and what kind of processing will be performed if a overtorque conditionis detected.When overtorque detection is enabled, be sure to set the overtorque detection level (L6-02 or L6-05)and the overtorque detection time (L6-02 or L6-05).An overtorque condition is detected when the currentexceeds the overtorque detection level for longer than the overtorque detection time.The overtorque detection level settings depend on the control method:

• Open-loop or flux vector control: Set as a percentageof the motor rated torque.
• Normal V/f or V/f with PG feedback control: Set as apercentage of the Inverter rated current.

Any of the following functions can be set in a multi-function output (H2-01, H2-02, or H2-03) to indicatefact that an overtorque condition has been detected.

S Setting B: Overtorque detection 1 (NO)
S Setting 18: Overtorque detection 2 (NO)
S Setting 17: Overtorque detection 1 (NC)
S Setting 19: Overtorque detection 2 (NC)

5. 8. 7Torque Limit: L7

L7-01 (Torq Del 1 Sel)	X	X	X	B	B

SettingRange

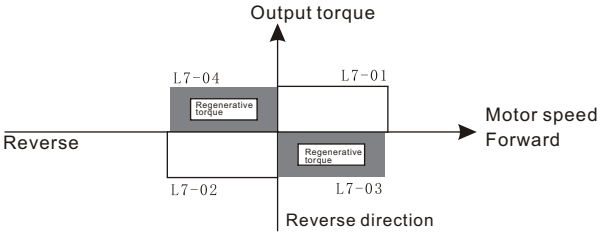
0~300 ★ [200]

Function

Sets the torque limit value as a percentageof the motor rated torque.Four individual regions can be set.

Description of choice

Torque limits can be set separately for the 4 ways that torque can be applied: forward torque, reversetorque, forward regenerative torque, and reverse forward regenerative torque.



Torque Limit Function

When the torque limit function is used, the torque limits have priority and motor speed control and compensation will be disregarded, so the acceleration/deceleration times might be lengthened and motor speedmight be reduced.

L7-02 (Torq Del 1 Lvl) X X X B B

SettingRange

0~300 ★ [200]

Function

Sets the torque limit value as a percentage of the motor rated torque.Four individual regions can be set.

Description of choice

Reference L7-01 selection

L7-03 (Torq Del 1 Time) X X X B B

SettingRange

0~300 ★ [200]

Function

Sets the torque limit value as a percentage of the motor rated torque.Four individual regions can be set.

Description of choice

Reference L7-01 selection

L7-04 (Torq Del 1 Sell) X X X B B

SettingRange

0~300 ★ [200]

Function

Sets the torque limit value as a percentage of the motor rated torque.Four individual regions can be set.

Description of choice

Reference L7-01 selection

5. 8. 8Hardware Protection: L8

L8-01 (DB Resistor Prot) X B B B B

SettingRange

Disabled ★ [0]
Enabled [1]

Function

Protect selection for internal DB resistor (Type ERF)

Description of choice

Setting	Function
0	Disabled. (Select 0 when a braking resistor isn't being used or a Braking Resistor Unit is being used.)
1	Enabled. (Protects the braking resistor from overheating.)

L8-02 (OH Pre-Alarm Lvl) X A A A A

SettingRange

50~110 ★ [95]

Function

Sets the detection temperature forthe Inverter overheat detection pre-alarm in °C.

Description of choice

Constant L8-02 specifies the detection temperature in °C for the Inverter overheat (OH) pre-alarmfunction. An overheat pre-alarm occurs when the temperature of the cooling fins reaches this level.

L8-03 (OH Pre-Alarm lvl) X A A A A

SettingRange

Decelerate to stop in deceleration time C1-02. [0]
Coast to stop [1]
Fast stop in fast-stop time C1 09 [2]
Continue operation (Monitor display only.) ★ [3]

Function

Sets the operation for when the Inverteroverheat pre-alarm goesON.

Description of choice

Constant L8-03 specifies the processing that will be performed when an overheat pre-alarm occurs.Apart from this setting, cooling fin overheating (OH1) is detected as a protection function at 105 C.

L8-05 (PH Los In Sel) X A A A A

SettingRange

Disabled ★ [0]
Enabled [1]

Function

Input open-phase protection selection

Description of choice

This function detects changes in the main circuit DC voltage which indicate a power supply openphase,large imbalance in the power supply voltage, or deterioration of the main circuit capacitor.

L8-07 (PH Los Out Sel) X A A A A

SettingRange

Disabled ★ [0]
Enabled [1]

Function

Output open-phase protection selection

Description of choice

When the motor capacity is small compared to the Inverter capacity, false open-phase detection mayoccur or open-phase cannot be detected. In this case, disable the detection function by setting L8-07to 0.

L8-10 (Gnd Det Sel) X A A A A

SettingRange

Disabled [0]
Enabled ★ [1]

L8-17 (L-spd IGBT Prtct) X A A A A

SettingRange

No carrier frequency reduction. [0]
With carrier frequency reduction. ★ [1]
For factory adjustments. [2]
For factory adjustments. [3]

Function

Carrier frequency reduction selection

Description of choice

When the motor capacity is small compared to the Inverter capacity, false open-phase detection mayoccur or open-phase cannot be detected. In this case, disable the detection function by setting L8-07 to 0.

L8-19 (OL2 Cbara@L-Spd) X A A A A

SettingRange

Disabled	★	[0]
Enabled		[1]

Function

OL2 characteristics selection at low speeds

Description of choice

When using OL2 to trip at low speeds (less than 6 Hz) despite a light load, set L8-17 to 1 (with carrierfrequency reduction) and L8-19 (OL2 characteristics selection at low speeds) to 0 (disabled).However, do not set l8-19 to 0 for 400 V class, 185 to 300 kW Inverters.Do not L8-17 and L8-19 to 0 at the same time when using V/f control and open loop vector control.Reduce the carrier frequency (C6-01) to 2 kHz when continuously operating at low speeds with heavyloads when using flux vector control.

5. 90perator Constants: o

5. 9. 1Monitor Select: o1

o1-01 (Monitor Select) 0 B B B B

SettingRange

4~38	★	[6]

Function

Constant No. Display selection

Description of choice

In operation mode, the frequency reference, output frequency, output current, and output voltage canbe monitored immediately if the factory settings are being used. One of these four values, the outputvoltage, can be changed to a different value.When you want to monitor a value other than the output voltage, set that number in constant o1-01.Use the last two digits from the "U1 Monitor" list (U1-jj) to select a value.

o1-02 (Power-On Monitor) 0 B B B B

SettingRange

Frequency reference	★	[1]
Output frequency		[2]
Output current		[3]
The monitor item set for o1-01		[4]

Function

Set the number of the monitor item to be

Description of choice

When the power is turned on, the frequency reference will appear in the Unit's data display if the factorysettings are being used.Any one of the four values monitored at startup (frequency reference, output frequency, output current,or the value set in constant o1-01) can be selected to appear when the power is turned ON.

o1-03 (Dispay Scaling) X B B B B

SettingRange

0.01 Hz	★	[0]
0.01%		[1]

Function

Sets the units that will be set and displayed for the frequency reference andfrequency monitor.

Description of choice

When the 40 to 39,999 range is used, any unit can be set for the reference frequency.For example, the frequency reference can be displayed or set in units such as mm/s or m/min to coincidewith the linear operating speed of the machine.

o1-04 (Display Units) X X X X B

SettingRange

Hz units	★	[0]
r/min units		[1]

Function

Set the V/f pattern setting units. (E1-04, 06,09 set units)

Description of choice

The setting units for constants E1-04, E1-06, and E1-09 can bechanged.The unit for other frequencies will not change. Constant o1-04 is specific to flux vector control.

o1-05 (Address Display) X A A A A

SettingRange

Normal display	★	[0]
Display MEMOBUS communications register address		[1]

Function

Set the Operator constant number display method.

5. 9. 2Multi-function Selections: o2

o2-01 (Local/remote Key) X B B B B

SettingRange

Disabled		[0]
Enabled	★	[1]

Function

Sets the Digital Operator Local/Remote Key

Description of choice

This constant enables or disables the LOCAL/REMOTE Key (the Operation Mode Selector Key) on the Digital Operator.

o2-02 (Oper Stop Key) X B B B B

SettingRange

Disabled		[0]
Enabled	★	[1]

Function

STOP Key during control circuit terminal operation

Description of choice

This constant enables or disables the STOP on the Digital Operator

o2-03 (User Defaults) X B B B B

SettingRange

STOP No change.	★	[0]
Record user defaults.		[1]
Clear user defaults.		[2]

Function

This constant is used to record or clear the user constant defaults.

Description of choice

If the "Out Of Memory Max Param Change" display appears on the digital operator when registeringthe user constants after the setting has been changed, do not immediately change or register the settingsbecause pre-registered user settings may be cleared.The Digital Operation display will return to 0 after the settings have been made.

o2-04 (Inverler Model#) X B B B B

SettingRange

0~FF ★Do not set.

Function

Do not set

Description of choice

The setting range and factory setting depend on the Inverter capacity.

O2-05 (operator M.o.p) X A A A A

SettingRange

Enter Key needed ★ [0]
Enter Key not needed [1]

Function

When the frequency reference isset on the Digital Operator frequencyreference monitor, setswhether the Enter Key is necessary.

Description of choice

This constant determines whether it is necessary to press the Enter Key when changing the frequencyreference with the Digital Operator's frequency reference monitor; it cannot be changed during operatio When o2-05 is set to 1 (DATA/ENTER Key input not required.), the frequency reference changes simultaneouslywith the Digital Operator's value.

o2-06 (Oper Delection) X A A A A

SettingRange

Disabled ★ [0]
Enabled [1]

Function

Sets the operation when the Digital Operator is disconnected.

o2-07 (Elapsed Time Set) X A A A A

SettingRange

0 65535 ★ [0]

Function

Sets the cumulative operation time in hour units.

Description of choice

Set the initial elapsed time in constant o2-07. The elapsed operating time will start from this value.

o2-08 (Elapsed Time Run) X A A A A

SettingRange

Cumulative time when the Inverter power is on. ★ [0]
Cumulative Inverter run time. [1]

Function

Cumulative operation time selection

Description of choice

Set the cumulative time

6 Troubleshooting

6.1 Protective and Diagnostic Functions

Fault Detection

- When the Inverter detects a fault, the fault code is displayed on the Digital Operator, the fault contact outputoperates, and the Inverter output is shut OFF causing the motor to coast to a stop. (The stopping method canbe selected for some faults, and the selected stopping method will be used with these faults.)
- When a fault has occurred, refer to the following table to identify and correct the cause of the fault.
- Use one of the following methods to reset the fault after restarting the Inverter:
- Turn ON the fault reset signal.
- (A multi-function input (H1-01 to H1-06) must be set to 14 (Fault Reset).)
- Press the RESET Key on the Digital Operator.
- Turn the main circuit power supply off and then on again.

Fault Displays and Processing

Fault Display	Meaning	Probable Causes	Corrective Actions
OC Overcurrent	Overcurrent The Inverter output current exceeded the overcurrent detection level. (200% of rated current)	at the Inverter output. (A short or ground fault can be caused by motor burn damage, worn insulation, or a damaged cable.) The load is too large or the acceleration/deceleration time is too short. A special-purpose motor or motor with a capacity too large for the Inverter is being used. A magnetic switch was switched at the Inverter output.	Reset the fault after correcting its cause.
GF Grornd Favlt	Ground Fault The ground fault current at the Inverter output exceeded approximately 50% of the Inverter rated output current.	A ground fault occurred at the Inverter output. (A ground fault can be caused by motor burn damage, worn insulation, or a damaged cable.)	Reset the fault after correcting its cause.
PUF DC Bus FuseOpen	Fuse Blown The fuse in the main circuit is blown.	The output transistor has failed because of a short-circuit or ground fault at the Inverter output. Check whether there is a short-circuit between the following terminals. A short-circuit will damage the output transistor: B1 (¯3) ↔ U, V, W © ↔ U, V, W	Replace the Inverter after correcting the cause.
SC Short Circuit	Load Short-circuit The Inverter output or load was shortcircuited.	A short-circuit or ground fault occurred or ground fault can be caused by motor burn damage, worn insulation, or a damaged cable.)	Reset the fault after correcting its cause.
OV Overvoltage	Main Circuit Overvoltage The main circuit DC voltage exceeded the overvoltage detection level.200 V class: Approx. 406 V 400 V class: Approx. 812 V	The deceleration time is too short and the regenerative energy from the motor is too large.	Increase the deceleration time or connecta braking resistor (or Braking Resistor Unit).
UV1 DC Bus Undervolt	Main Circuit Undervoltage The main circuit DC voltage is below the undervoltage detection level (L2-05). 200 V class: Approx. 190 V 400 V class: Approx. 380 V	An open-phase occurred with the input power supply. A momentary power loss occurred. The wiring terminals for the input power supply are loose. The voltage fluctuations in the input power supply are too large.	Reset the fault after correcting its cause.
UV2 CTL PS Undervolt	Control Power Fault The control power supply voltage dropped.	—	Try turning the power supply off and on. Replace the Inverter if the fault continuesto occur.
UV3 MC Answerback	Inrush Prevention Circuit Fault A fault occurred in the inrush prevention circuit.	—	Try turning the power supply off and on. Replace the Inverter if the fault continues to occur
PF Input Pha Loss	Main Circuit Voltage Fault The main circuit DC voltage oscillates unusually (not when regenerating). This fault is detected when L8-05 is set to "Enabled."	An open-phase occurred in the input power supply. A momentary power loss occurred. The wiring terminals for the input power supply are loose. The voltage fluctuations in the input power supply are too large. The voltage balance between phases is bad.	Reset the fault after correcting its cause.

Fault Display	Meaning	Probable Causes	Corrective Actions
LF Output Pha Loss	Output Open-phase An open-phase occurred at the Inverter output. This fault is detected when L8-07 is set to "Enabled."	There is a broken wire in the output cable. There is a broken wire in the motorwinding. The output terminals are loose. The motor being used has a capacity less than 5% of the Inverter's maximum motor capacity.	Reset the fault after correcting its cause. Check the motor and Inverter capacity.
OH(OH1) Heatsink Over tmp	Cooling Fin Overheating The temperature of the Inverter's cooling fins exceeded the setting in OH: The temperature exceeded the setting in L8-02 (Stopping method b h db L8 03) Heatsink Over tmp g pp g can be changed by L8-03.). OH1: The temperature exceeded 105°C (Stopping method: Coast to stop).	The ambient temperature is too high. There is a heat source nearby. The Inverter's cooling fan has stopped.	Install a cooling unit. Remove the heat source. Replace the cooling fan. (Contact our sales representative.)
	Inverter's Cooling Fan Stopped (18.5 kW or larger)	The Inverter's cooling fan has stopped. (18.5 kW or larger)	
RH Dyn Brk Resistor	Installed Braking Resistor Overheating The braking resistor is overheated and the protection function set with L8-01 has operated.	The deceleration time is too short and the regenerative energy from the motor is too large.	Reduce the load, increase the deceleration time, or reduce the motorspeed. Change to a Braking Resistor Unit.
RR Dyn Brk Transistr	Internal Braking Transistor Fault The braking transistor is not operating properly.	—	Try turning the power supply off and on. Replace the Inverter if the fault continuesto occur.
OL1 Motor Overloaded	Motor Overload The motor overload protection function has operated based on the inter-nal electronic thermal value.	The load is too heavy. The acceleration time, deceleration time, and cycle time are too short. The V/f characteristics voltage is too high. The motor's rated current setting (E2-01) is incorrect.	Check the size of the load and the length of the acceleration, deceleration, and cycle times. Check the V/f characteristics. Check the motor's rated current setting (E2-01).
OL2 Inv Overloaded	Inverter Overload The Inverter overload protection function has operated based on the internal electronic thermal value.	The load is too heavy. The acceleration time, deceleration time and cycle time are too short. The V/f characteristics voltage is too high. The Inverter capacity is too low.	Check the size of the load and the length of the acceleration, deceleration,and cycle times. Check the V/f characteristics. Replace the Inverter with one that hasa larger capacity.
OL3 Overtorque Det1	Overtorque 1 There has been a current greater than the setting in L6-02 for longer than the setting in L6-03.	—	Make sure that the settings in L6-02 and L6-03 are appropriate. Check the mechanical system and correct the cause of the overtorque.
OL4 Overtorque det2	Overtorque 2 There has been a current greater than the setting in L6-05 for longer than the setting in L6-06.	—	Make sure that the current setting in L6-05 and time setting in L6-06 are appropriate. Check the mechanical system and correct the cause of the overtorque.
OS Over speed	Overspeed The speed has been greater than the setting in F1-08 for longer than the setting in F1-09.	Overshooting/Undershooting are occurring. The reference speed is too high. The settings in F1-08 and F1-09 aren't appropriate.	Adjust the gain again. Check the reference circuit and referOver ence gain. Check the settings in F1-08 and F1-09.
PGO PG open	PG Disconnection Detected PG pulses aren't being input due to the following conditions:The status has exceeded F1-14 time.Flux vector: Soft start output ≥ 2% Flux V/f: Soft start output ≥ E1-09	There is a break in the PG wiring. The PG is wired incorrectly. Power isn't being supplied to the PG.	Fix the broken/disconnected wiring. Fix the wiring. Supply power to the PG properly. Check for open circuit when using brake (motor).
DEV Speed Deviation	Excessive Speed DeviationAfter the actual (motor) speed and the reference speed agree (depending on the setting of F1−04), the speed devi-ationchanges so it is greater than the setting in F1 10 for longer than thesetting in F−11.	The load is too heavy. The acceleration time an deceleration time are too short. The load is locked. The settings in F1-10 and F1-11	Reduce the load. Lengthen the acceleration time and deceleration time. Check the mechanical system. Check the settings in F1-10 and F1-11. Check for open circuit when using brake (motor).

Fault Display	Meaning	Probable Causes	Corrective Actions
SVE Zero Servo Fault	Zero Servo Fault The rotation position moved during zero servo operation.	The torque limit is too small.	Increase the limit.
		The load torque is too large.	Reduce the load torque.
		——	Check for signal noise.
OPR Oper Disconnect	Operator Connection Fault The Operator was disconnected during operation started by a run command from the Operator.	——	Check the Operator connection.
EF0 Opt External Fit	External fault input from Transmission Option Card.	——	Check the Transmission Option Card and transmission signal.
EF3 External Fault 3	External fault (Input terminal 3)		
EF4 EF5 EF6 EF7 EF8	External fault (Input terminal 4) External fault (Input terminal 5) External fault (Input terminal 6) External fault (Input terminal 7) External fault (Input terminal 8)	An "external fault" was input from amulti-function input	Reset external fault inputs to themulti -function inputs.Remove the cause o the external fault.
CPF00 COM-ERR(OP&INV)	Operator Communications Error 1 Communications with the Operator were not established within 5 seconds after the power was turned on.	The Digital Operator's connector isn't connected properly.	Disconnect the Digital Operator and then connect it again.
		The Inverter's control circuits are faulty.	Replace the Inverter.
CPF01 COM-ERR(OP&INV)	Operator Communications Error 2 After communications were established there was a transmission error with the Digital Operator for more than 2 seconds.	The Digital Operator isn't connected properly.	Disconnect the Digital Operator and then connect it again.
		The Inverter's control circuits are faulty.	Replace the Inverter.
CPF02 BB Circuit Err	Baseblock circuit error	——	Try turning the power supply off and on again.
			Replace the Inverter.
CPF03 EEPROM Error	EEPROM error	——	Try turning the power supply off and on again
		The control circuit is damaged.	Replace the Inverter.
CPF04 Internal A/D Err	CPU internal A/D converter error	——	Try turning the power supply off and on again.
		The control circuit is damaged.	Replace the Inverter.
CPF05 External A/D Err	CPU external A/D converter error	——	Try turning the power supply off and on again.
		The control circuit is damaged.	Replace the Inverter.
CPF04 Internal A/D Err	CPU internal A/D converter error	——	Try turning the power supply off and on again.
			Replace the Inverter.
CPF05 External A/D Err	CPU external A/D converter error	——	Try turning the power supply off and on again.
			Replace the Inverter.
CPF06 Option Error	Option Card connection error	The Option Card is not connected properly.	Turn off the power and insert the Card again.
		The Inverter or Option Card is faulty.	Replace the faulty component.
CPF20 Option A/D Err	Option Card A/D converter error	The Option Card is not connected properly.	Turn off the power and insert the Card again.
		The Option Card's A/D converter is faulty.	Replace the Option Card.
CPF21 Option CPU down	Transmission Option Card self diagnostic error	Option Card fault.	Replace the Option Card.
CPF22 Option Type Err	Transmission Option Card model code error		
CPF23 option dpram err	Transmission Option Card DPRAM error		

6.1.2 Minor Fault Detection

Minorfaults are atype of Inverter protection function thatdonot operate the fault contact outputandare automaticallyreturned to their original status once the cause of the minor fault has been removed. The Digital Operator display blinks and the minor fault is output from the multi-function outputs (H2-01 to H2-03).Take appropriate countermeasures according to the table below.

Minor Fault Displays and Processi

Minor fault display	Meaning	Probable causes	Corrective Actions
EF (BOINKING) EXTERNAL FAULT	Forward/Reverse Run Commands Input Together Both the forward and reverse run commands have been ON for more than 0.5 s.	——	Check the sequence of the forward and reverse run commands. :Since the rotational direction is unknown, the motor will be decelerated to a stop when this minor fault occurs.
UV (BOINKING) DC BUS UNDERVOLT	Main Circuit Undervoltage The following conditions occurred when there was no Run signal. The main circuit DC voltage was below the undervoltage detection level (L2-05). The surge current limiting contactor opened. The control power supply voltage when below the CUV level.	See causes for UV1, UV2, and UV3 faults.	See corrective actions for UV1, UV2, and UV3 faults.
OV (BOINKING) OVERVOLTAGE	Main Circuit Overvoltage The main circuit DC voltage exceeded the overvoltage detection level. 200 V class: Approx. 406 V 400 V class: Approx. 812 V	The power supply voltage is too high.	Decrease the voltage so it's within specifications.
OH (BLINKING) HEATSINK OVER TMP	Cooling Fin OverheatingThe temperature of the Inverter'scooling fins exceeded the setting inL8-02.	The ambient temperature is too high. There is a heat source nearby. The Inverter cooling fan has stopped.	Install a cooling unit. Remove the heat source. Replace the cooling fan. (Contact your Yaskawa representative.)
OH2 (BOINKING) OVERTORQUE DET 1	Inverter Overheating Pre-alarmAn Oh2 alarm signal (Inverter overheating alarm signal) was input from a multi-function input.	——	Clear the multi-function input's overheating alarm input.
OL3 (BLINKING) Overtorqeue Det 1	Overtorque 1 There has been a current greater than the setting in L6-02 for longer than the setting in L6-03.	——	Make sure that the settings in L6-02 and L6-03 are appropriate. Check the mechanical system and correct the cause of the overtorque.
OL4 (BLINKING) Overtorque Det 1	Overtorque 2 There has been a current greater than the setting in L6-05 for longer than the setting in L6-06.	——	Make sure that the current setting in L6-05 and time setting in L6-06 are appropriate. Check the mechanical system and correct the cause of the overtorque.
OS(blinking) Overtorque Det1	OverspeedThe speed has been greater than thesetting in F1-08 for longer than the setting in F1-09.	Overshooting/undershooting are occurring. The reference speed is too high. The settings in F1-08 and F1-09 aren't appropriate.	Adjust the gain again. Check the reference circuit and refer-ence gain. Check the settings in F1-08 andF1-09.
PGO(blinking) Pgopen	The PG is disconnected.The Inverter is outputting a frequency, but PG pulses aren't being input.	There is a break in the PG wiring. The PG is wired incorrectly. Power isn't being supplied to the PG.	Fix the broken/disconnected wiring. Fix the wiring. Supply power to the PG properly.
DEV(boinking) Speed Deviation	Excessive Speed Deviation The speed deviation has been greater than the setting in F1-10 for longer than the setting in F1-11.	The load is too large. The acceleration time and deceleration time are too short. The load is locked. The settings in F1-10 and F1-11 aren't appropriate.	Reduce the load. Lengthen the acceleration time and deceleration time. Check the mechanical system. Check the settings in F1-10 andF1

Minor fault display	Meaning	Probable causes	Corrective Actions
EF3 (blinking) External Fault 3	External fault (Input terminal 3)	An "external fault" was input from amulti-function input	Reset external fault inputs to themult i-function inputs.Remove the cause of the externalfault.
EF4 (blinking)	External fault (Input terminal 4)		
EF5 (blinking)	External fault (Input terminal 5)		
EF6 (blinking)	External fault (Input terminal 6)		
EF7 (blinking)	External fault (Input terminal 7)		
EF8 (blinking)	External fault (Input terminal 8)		
CE MEMOBUS Com Err	Communications Error Normal reception was not possible for 2 s after received control data.	–	Check the communications devices and signals.
BUS Option Com Err	Option Card Transmission Error A communications error occurred in a mode where the run command or a frequency reference is set from an Transmission Option Card.	–	Check the Transmission Card and signals.
CALL Serial Com Call	SI-B Communications Error Control data was not normally received when power was turned ON.	–	Check the communications devices and signals.
E-15 Si-F/G Com Err	SI-F/G Communications Error Detected A communications error occurred in a mode where run or a frequency reference is set from an Transmission Option Card and E-15 is set to continue operation	–	Check the communications signals.
EF0 Opt External Flt	SI-K2 External Error Detected An external error ware received from an Option Card when EF0 was set to continue operation.	–	Remove the cause of the external erro

6.1.3 Operation Errors

After the constants have been set, an operation error will occur if there is an invalid setting or a contradiction between two constant settings.It won't be possible to start the Inverter until the constants have been set correctly. (The minor fault output and fault contact output will not operate, either.)
When an operation error has occurred, refer to the following table to identify and correct the cause of the errors.

Operation Error Displays and Incorrect Settings

Display	Meaning	Incorrect settings
OPE01	Incorrect Inverter capacity setting	The Inverter capacity setting doesn't match the Unit. (Contact your Yaskawa representative.)
OPE02 Limit	Constant setting range error	The constant setting is outside of the valid setting range.
OPE03 Terminal	Multi-function input selection error	One of the following errors has been made in the multi-function input (H1-01 to H1-06) settings: The same setting has been selected for two or more multi-function inputs. An up or down command was selected independently. (They must be used together.) The up/down commands (10 and 11) and Accel/Decel Ramp Hold (A) were selected at the same time. Speed Search 1 (61, maximum output frequency) and Speed Search 2 (62. set frequency)were selected at the same time. External BaseblockNO(8) and External Baseblock NC (9) were selected at th e sametime. The up/down commands (10 and 11) were selected while PID control (b5-01) wasenabled.S The Terminal 13/14 Switch (1F) was selected, but the terminal 14 function selector(H3-09) wasn't set to frequency reference (1F). Positive and negative speed commands have not been set at the same time. The emergency stop command NO and NC have been set at the same time.
OPE05 Sequence Select	Option Card selection error	The Option Card was selected as the frequency reference source by setting b1-01 to 3, but an Option Card isn't connected
OPEN06 PG Opt Missing	Control method selection error	V/f control with PG feedback was selected by setting A1-02 to 1, but a PG Speed Control Card isn't connected. Flux vector control was selected by setting A1-02 to 3, but a PG Speed Control Card isn't connected.
OPE07 ANALOG SELECTION	Multi-function analog input selection error	The same setting (other than 1F) has been selected for H3-05 and H3-09. S An A1-14B Analog Reference Card is being used and F2-01 is set to 0, but a multifunctionninput (H1-01 to H1-06) has been set to Option/Inverter Selection (2). S 2 and D have been set to H3-05 and H3-09 (2 and D cannot be used simultaneously).
OPE08 ELEVATOR TABLE	Constant selection error	A setting has been made that is not required in the current control method. Ex.: A function used only with flux vector control was selected for open-loop vector control.
OPE10 V/F PTRN SETTING	V/f data setting error	Constants E1-04, E1-06, E1-07, and E1-09 do not satisfy the following conditions: S E1-04 (FMAX) ≥ E1-06 (FA) > E1-07 (FB) ≥ E1-09 (FMIN)
OPE 11 CARRFRG /ON /DELAY	Constant setting error	One of the following constant setting errors exists. The carrier frequency upper limit (C6-01) > 5 KHz and the carrier frequency lower limit (C6-02) ≤ 5 KHz. The carrier frequency gain (C6-03) > 6 and (C6-01) > (C6-02). Upper/lower limit error in C6-01 to 03 or C8-15.
ERR EEPROM RNV ERR	EEPROM write error	A verification error occurred when writing EEPROM. Try turning the power supply off and on again. Try setting the constants again.

6.2 Troubleshooting

Due to constant setting errors, faulty wiring, and so on, the Inverter and motor may not operate as expected whenthe system is started up. If that should occur, use this section as a reference and apply the appropriate measures.If the contents of the fault are displayed, refer to 9.1 Protective and Diagnostic Functions.

6.2.1 If Constant Constants Cannot Be Set

■ The display does not change when the Increment and Decrement Keys are pressed.

1. Passwords do not match. (Only when a password is set.)
   - If the constant A1-04 (Password 1) and A1-05 (Password 2) numbers are different, the constants for the initialize mode cannot be changed. Reset the password.
   - Ifyoucannotrememberthepassword,displayA1-05(selectpassword)bypressingthe Reset/SelectKey and the Menu Key simultaneously while in the A1-04 display. Then reset the password. (Input the reset password in constant A1-04.)
2. Constant write enable is input.
   - This occurs when "constant write enable" (set value: 1B) is set for a multi-function input. If the constant write enable input is OFF, the constants cannot be changed. Turn it ON and then set the constants.
3. The Inverter is operating (drive mode).
   - There are some constants that cannot be set during operation. Turn the Inverter off and then make the settings.

■ OPE01 through OPE11 is displayed.
This is a constant setting error. The set value for the constant is wrong. Refer to 9.1.3 Operation Errors and correct the setting.

■ CPF00 or CPF01 is displayed.
This is a Digital Operator communications error. The connection between the Digital Operator and the Inverter may be faulty. Remove the Digital Operator and then re-install it.

6.2.2 If the Motor Does Not Operate

■ The motor does not operate when the Run Key on the Digital Operator is pressed.

1. The operation method setting is wrong.
   Run Key is pressed. Either press the Local/Remote Key* to switch to Digital Operator operation or set constant b1-02 to "0" (Digital Operator).
   :The Local/Remote Key is enabled (set value: 1) or disabled (set value: 2) by means of constant o2-01. It is enabled when the drive mode is entered.
2. The frequency reference is too low.
   - Verterwill not operate.
   - Raise the frequency reference to at least the minimum output frequency. (Related constants: b1-05, E1-09)
3. There is a multi-function analog input setting error.
   - If multi-function analog inputs H3-05 and H3-09 are set to "1" (frequency gain), and if no voltage
   - (current)is input, then the frequency reference will be zero. Check to be sure that the set value and analog
   - input value are correct.
4. Frequency reference 2 is specified with multi-step speed operation, and auxiliary frequency reference is not input.
   - If multi-function analog inputH3-05is set to"0"(auxiliary frequencyreference),andif multi-stepspeed reference is used, the auxiliary frequency reference will be treated as frequency reference 2. Check to be sure that the set value and analog input value (terminal 16) are correct.
5. A digital setting was made for frequency reference 2 for multi-step speed operation.
   - The auxiliary frequency reference is treated as frequency reference 2 when the multi-step speed referencesare usedand"0" (auxiliary frequency reference) is set for the multi-function analog input
   - (H3-05).Make sure that "1F" is set for the multi-function analog input (H3-05) and that the setting of frequency reference 2 is appropriate.
6. "1F" was not set for a multi-function analog input
   - The auxiliary frequency reference is treated as frequency reference 2 when the multi-step speed references are usedand"0" (auxiliary frequency reference) is set for the multi-function analog input (H3-05).
   - Make sure that "1F" is set for the multi-function analog input (H3-05) and that the setting of frequency reference 2 is appropriate.

■ The motor does not operate when an external operation signal is input.

1. The operation method selection is wrong.
   - If constantb1-02(run source) is set to"0" (Digital Operator), themotor will not operatewhenanexternal operation signal is input. Set b1-02 to "1" (control circuit terminal) and try again.
   - Similarly, the motor will also not operate if the Local/Remote Key has been pressed to switch to Digital Operator operation. In that case press the Local/Remote Key* again to return to the original setting.
   :The Local/Remote Key is enabled (set value: 1) or disabled (set value: 2) by means of constant o2-01. It is enabled when drive mode is entered.
2. A 3-wire sequence is in effect.
   - The input method for a 3-wire sequence is different than when operating by forward/stop and reverse/stop (2-wire sequence).When 3-wire sequence is set, the motor will not operate even when an input terminalsuitable for forward run/stop and reverse run/stop is turned ON.

- When using a 3-wire sequence, refer to the timing chart on page 6 - 14 and input the proper signals. When using a 2-wire sequence, set multi-function inputs H1-01 through H1-06 to a value other than 0.

3 The frequency reference is too low.
- If the frequency reference is set below the frequency set in E1-09 (minimum output frequency), the Inverter will not operate.
- Raise the frequency reference to at least the minimum output frequency. (Related constants: b1-05, E1-09)

4 There is a multi-function analog input setting error.
- If multi-function analog inputs H3-05 and H3-09 are set to "1" (frequency gain), and if no voltage (
- current)is input, then the frequency reference will be zero. Check to be sure that the set value and analoginput value are correct.

5 Frequency reference 2 is specified with multi-step speed operation and auxiliary frequency reference is not input.
- If multi-function analog input H3-05is set to "0" (auxiliary frequency reference) and if multi-step speed reference is used, the auxiliary frequency reference will be treated as frequency reference 2. Check to be sure that the set value and analog input value (terminal 16) are correct.

6 A digital setting was made for frequency reference 2 for multi-step speed operation, but "1F" was not set for a multi-function analog input (H3-05).
- The auxiliary frequency reference is treated as frequency reference 2 when the multi-step speed references are usedand"0" (auxiliary frequency reference) is set for the multi-function analog input (H3-05).
- Make sure that "1F" is set for the multi-function analog input (H3-05) and that the setting of frequency reference 2 is appropriate.

7 A digital setting was made for frequency reference 2 for multi-step speed operation, but"1F" was not se for a multi-function analog input (H3-05).
- The auxiliary frequency reference is treated as frequency reference 2 when the multi-step speed references are usedand"0" (auxiliary frequency reference) is set for the multi-function analog input (H3-05).
- Make sure that "1F" is set for the multi-function analog input (H3-05) and that the setting of frequency reference 2 is appropriate.

■ The motor stops during acceleration or when a load is connected.

xThe load may be too heavy. The Inverter has a stall prevention function and an automatic torque boost function, but the motor responsiveness limit may be exceeded if acceleration is too rapid or if the load istooheavy.Lengthentheaccelerationtimeorreducetheload.Alsoconsiderincreasingthemotorcapacity.

■ The motor only rotates in one direction.

"Reverse run prohibited" is selected. If b1-04 (prohibition of reverse operation) is set to "1" (reverse runprohibited), the Inverter will not receive reverse run commands.To use both forward and reverse operation,set b1-04 to "0."

6. 2. 3 If the Direction of the Motor Rotation is Reversed

The motor output wiring is faulty. When the Inverter T1(U), T2(V), and T3(W) are properly connected to the motor T1(U), T2(V), and T3(W), the motor operates in a forward direction when a forward run commandis executed.Theforward directiondependsonthe manufacturerand themotor type, sobesure to check the specifications. Switching two wires among the T1(U), T2(V), and T3(W) will reverse the direction of rotation.

6. 2. 4 If the Motor Does Not Put Out Torque or If Acceleration is Slow

■ The torque limit has been reached.

Whena torque limit has been set in constants L7-01 to L7-04, no torque will be output beyond that limit. This can cause the torque to be insufficient, or the acceleration time to be too long. Check to be sure that the value set for the torque limit is suitable.
If the torque limit has been set by multi-function analog inputs H3-05 and H3-09 (set value: 10 to 13), check to be sure that the analog input value is suitable.

■ The stall prevention level during acceleration is too low.

If the value set forL3-02 (stall prevention level during acceleration) is toolow, the acceleration time will be too long. Check to be sure that the set value is suitable.

■ The stall prevention level during running is too low.

If the value set for L3-06 (stall prevention level during running) is too low, the speed will drop before outputting torque. Check to be sure that the set value is suitable.

■ Autotuning has not been performed for vector control

Vector control will not perform if autotuning has not been performed. Perform autotuning separately for the motor, or set the motor constants through calculations. Alternatively, change the control mode selection (A1-02) to V/f control.

6. 2. 5 If the Motor Does Not Operate According to Reference

■ The motor runs faster than reference.

1 The frequency reference bias setting is wrong (the gain setting is wrong).
The frequency reference bias set in constant H3-03 is added to the frequency reference. Check to be surethat the set value is suitable.

2 Frequency bias is set for multi-function analog inputs.
When "2" (frequency bias) is set for multi-function analog inputs H3-05 and H3-09, a frequency correspondingto the input voltage (current) is added to the frequency reference . Check to be sure that the setvalue and analog input value are suitable.

3 A signal is being input to the frequency reference (current) terminal 14.

When "1F" (frequency reference) is set for constant H3-09 (multi-function analog input terminal 14), a frequency corresponding to the terminal 14 input voltage (current) is added to the frequency reference. Check to be sure that the set value and analog input value are suitable.

■ The motor does not rotate according to reference.

Torquecontrolmodeis selected.Whenconstantd5-01(torque controlselection) is set to"1"(torquecontrol), speed control cannot be executed. (Speed limits can be set.)To switch torque control and speed control, set the following

- Set constant d5-01 to “0” (speed control).
- Set one of the constants from H1-01 through H1-06 (multi-function inputs) to “71” (speed/torque control change).

6.2.6 If the Slip Compensation Function Has Low Speed Precision

- The slip compensation limit has been reached.With the slip compensation function, compensation cannot be carried out beyond the slip compensation limit set in constant C3-03. Check to be sure that the set value is suitable.

6.2.7 If There is Low Speed Control Accuracy at High-speed Rotation in Open-loop Vector Control Mode

- The motor’s rated voltage is high.
- The Inverter’s maximum output voltage is determined by its input voltage. (For example, if 200 VACis input, then the maximum output voltage will be 200VAC.) If, as a result of vector control, the output
- voltage reference value exceeds the Inverter output voltagemaximumvalue, the speed control accuracywill decrease.
- Set C3-06 to 1, or, alternatively use a motor with a low rated voltage (i.e., a special motorfor use with vector control), or change to flux vector control.

6.2.8 If Motor Deceleration is Slow

■ The deceleration time is long even when braking resistor is connected.

1. “Stall prevention during deceleration enabled” is set.
   - When braking resistor is connected, set constant L3-04 (stall prevention selection during deceleration) to “0” (disabled) or “3” (deceleration stall prevention with braking resistor). Whenthis constant is set to “1” (enabled, the factory-set default), braking resistor does not fully function.
2. The deceleration time setting is too long.
   - Check the deceleration time setting (constants C1-02, C1-04, C1-06, and C1-08).
3. Motor torque is insufficient.
   - If the constants are correct and there is no overvoltage fault, then the motor’s power is limited. Consider increasing the motor capacity.
4. The torque limit has been reached.
   - Whena torque limit has been set in constants L7-01 to L7-04, no torque will be output beyond that limit.
   - This can cause the deceleration time to be too long. Check to be sure that the value set for the torque limit is suitable.
   - If the torque limit has been set by multi-function analog inputs H3-05 and H3-09 (set value: 10 to 13), check to be sure that the analog input value is suitable.

■ If the Vertical-axis Load Drops When Brake is Applied

- The sequence is incorrect.
- The Inverter goes intoDCinjection braking status for 0.5 seconds after deceleration is completed. (This is the factory-set default.)
- Toensurethatthebrakeholds, setfrequencydetection2(H2-01=5) for the multi-function contactoutput terminals (9-10) so that the contacts will OPENwhen the output frequency is greater than L4-01 (3.0 to 5.0 Hz). (The contacts will close below L4-01.)
- There is hysteresis in frequency detection 2 (L4-02 = 2.0 Hz) . Change the setting to approximately 0.5 Hz if there are drops during stop.Donot use the “running” signal (H2-01 = 0) for the brake ON/OFF signal.

6.2.9 If the Motor Overheats

■ The load is too big.

- If the motor load is too heavy and the motor is used with the effective torque exceeding the motor’s rated torque, the motor will overheat. Some motor rating are given for short period performance and are not continuousratings.Reducetheloadamountbyeither lightening theload orlengthening the acceleration/deceleration time. Also consider increasing the motor capacity.

■ The ambient temperature is too high.

- The motor rating is determined within a particular ambient operating temperature range. The motor will burn out if it is run continuously at the rated torque in an environment in which the maximum ambient operating temperature isexceeded.Lowerthemotor’sambienttemperatureto within the acceptableambient operating temperature range.

■ The withstand voltage between the motor phases is insufficient.

- When the motor is connected to the Inverter output, a surge is generated between the Inverter switching andthemotorcoil.Normallythemaximumsurgevoltage is three timesthe Inverter’s inputpowersupply voltage (i.e., 1,200Vfor 400Vclass).Besure to use a motor with a withstand voltage between the motor phases that is greater than the maximum surge voltage. In particular, when using a 400Vclass Inverter, use a special motor for Inverters.

■ Autotuning has not been performed for vector control

- Vector control will not perform if autotuning has not been performed. Perform autotuning separately for the motor, or set the motor constants through calculations. Alternatively, change the control mode selection (A1-02) to V/f control.

6.2.10 If There is Noise When the Inverter is Started or From an AM Radio

If noise is generated by Inverter switching, implement the following countermeasures:

- Lower the Inverter’s carrier frequency (constant C6-01). This will help to some extent by reducing the amount of internal switching.
- Install an Input Noise Filter at the Inverter’s power supply input area.
- Install an Output Noise Filter at the Inverter’s power supply output area.
- Use metal tubing. Electric waves can be shielded by metal, so encase the Inverter with metal (steel).
- Ground the Inverter and motor.
- Separate main circuit wiring from control wiring.

6.2.11 If the Ground Fault Interrupter Operates When the Inverter is Run

TheInverter performs internal switching, so there is a certainamount of leakage current. Thismaycause the ground fault interrupter to operate and cut off the power supply. Change to a ground fault interrupterwith a high leakage detection level (i.e., a sensitivity current of 200mAor greater per Unit, with an operatingtime of 0.1 s or more), or one that incorporates high frequency countermeasures (i.e., One designedfor use with Inverters). It will also help to some extent to lower the Inverter's carrier frequency (constant C6-01). In addition, remember that the leakage current increases as the cable is lengthened.

6.2.12 There is Mechanical Oscillation

■ The machinery is making unusual sounds.

1. There may be resonance between the mechanical system's characteristic frequency and the carrier frequency.
   If the motor is running with no problems and the machinery is oscillating with a high-pitched whine, itmay indicate that this is occurring. To prevent this type of resonance, adjust the carrier frequency withconstants C6-01 to C6-03.
2. There may be resonance between a machine's characteristic frequency and the output frequency of the Inverter.
   To prevent this from occurring, either use the jump frequency functions in constants d3-01 to d3-04 orinstall rubber padding on the motor base to reduce oscillation.

■ Oscillation and hunting are occurring with open-loop vector control.

The gain adjustment may be insufficient. Reset the gain to a more effective level by adjusting constants C4-02 (torque compensation time constant), C8-08 (AFRgain), and C3-02 (slip compensation primarydelay time) in order. Lower the gain setting and raise the primary delay time setting.

Vector control will not perform if autotuning has not been performed. Perform autotuning separately for the motor, or set the motor constants through calculations. Alternatively, change the control mode selection (A1-02) to V/f control.

■ Oscillation and hunting are occurring with V/f control.

The gain adjustment may be insufficient. Reset the gain to a more effective level by adjusting constantsC4-02 (torque compensation time constant), C7-02 (hunting prevention gain), and C3-02 (slip compensationprimary delay time) in order. Lower the gain setting and raise the primary delay time setting.

■ Oscillation and hunting are occurring with flux vector control.

Thegain adjustmentmaybeinsufficient. Adjust the various types of speed control loop(ASR)gain.
Thegain adjustmentmaybeinsufficient. Adjust the various types of speed control loop(ASR)gain.
If the mechanical system's resonance point coincides with the Inverter's operating frequencyand the oscillationcannotbeeliminatedinthisway, increasetheASRprimarydelaytime(constantC5-06)andthen try adjusting the gain again.
Vector control will not perform if autotuning has not been performed. Perform autotuning separately for the motor, or set the motor constants through calculations. Alternatively, change the control mode selection (A1-02) to V/f control.

■ Oscillation and hunting are occurring with V/f w/PG control.

Thegain adjustmentmaybeinsufficient. Adjust the various types of speed control loop(ASR)gain. (For details, refer to page 6 - 45.)
If the oscillation cannot be eliminated in this way, set the hunting prevention selection (constant C7-01) to "0" (disabled) and then try adjusting the gain again.
Oscillation and hunting are occurring with PID control.
Check the oscillation cycle and individually adjust the P, I, and D.
Autotuning has not been performed with vector control.
Vector control will not perform if autotuning has not been performed. Perform autotuning separately for the motor, or set the motor constants through calculations. Alternatively, change the control mode selection (A1-02) to V/f control.

6.2.13 If the Motor Rotates Even When Inverter Output is Stopped

The DC injection braking is insufficient. If the motor continues operating at low speed, without completely stopping, and after a deceleration stop has been executed, it means that theDCinjection braking is not decelerating enough. Adjust the DC injection braking as follows:
Increase the constant b2-02 (DC injection braking current) setting.
Increase the constant b2-04 (DC injection braking time at stop) setting.

6.2.14 If 0 V is Detected When the Fan is Started, or Fan Stalls

Generation of 0Vand stalling can occur if the fan is turning when it is started. TheDCinjection braking is insufficient when starting.
This can be prevented by slowing fan rotation byDCinjection braking before starting the fan.
Increasethe constant b2-03 (DC injection braking time at start) setting.

6.2.15 If Output Frequency Does Not Rise to Frequency Reference

■ The frequency reference is within the jump frequency range.

When the jump frequency function is used, the output frequency does not change within the jump frequency range.
Checkto be sure that thejumpfrequency (constants d3-01 to d3-03) and jumpfrequency width (constant d3-04) settings are suitable.
The frequency reference upper limit has been reached.
The output frequency upper limit is determined by the following formula:
Maximum output frequency (E1-04) × Frequency reference upper limit (d2-01) / 100
Check to be sure that the constant E1-04 and d2-01 settings are suitable.

7 Maintenance and Inspection

7.1

The maintenance period of the Inverter is as follows:
Maintenance Period:Within 18 months of shipping from the factory or within 12 months of being delivered to the final user, whichever comes first.

7.1.1 Daily Inspection

Check the following items with the system in operation.
The motor should not be vibrating or making unusual noises.
There should be no abnormal heat generation.
The ambient temperature should not be too high.
The output current value shown on the monitor display should not be higher than normal.
The cooling fan on the bottom of theInverter should be operating normally.

7 1.2 Periodic Inspection

Check the following items during periodic maintenance.Always turn OFF the power supply before beginning inspection. Confirm that the LED indicators on the front cover have all turnedOFF, and then wait until at least one minute (or at least three minutes for Invertersof 30kWor more) has elapsed before beginning the inspection. Be sure not to touch terminals right after thepower has been turned off. Doing so can result in electric shock.

Periodic Inspections

Item	Inspection	Corrective Procedure
External terminals, mounting bolts bolts, connectors, etc.	Are all screws and bolts tight? Are connectors tight?	Tighten loose screws and bolts firmly. Reconnect the loose connectors.
Cooling fins	Are the fins dirty or dusty?	Clean off any dirt and dust with an air gun using dry air at a pressure of 39.2 × 104 to 58.8 × 104 Pa (4 to 6 kgScm2).
PCBs	Is there any conductive dirt or oil mist on the PCBs?	Clean off any dirt and dust with an airgun using dry air at a pressure of 39.2 ×104 to 58.8 × 104 Pa (4 to 6 kgScm2).Replace the boards if they cannot bemade clean.
Cooling fan	Is there any abnormal noise or vibration or has the total operating time exceeded 20,000 hours?	Replace the cooling fan.
Power elements	Is there any conductive dirt or oil mist on the elements?	Clean off any dirt and dust with an air gun using dry air at a pressure of 39.2 × 104 to 58.8 × 104 Pa (4 to 6 kgScm2).
Smoothing capacitor	Are there any irregularities, such as discoloration or odor?	Replace the capacitor or Inverter.

7.1.3 Periodic Maintenance of Parts

The Inverter is configured of many parts, and these parts must be operating properly in order to make full use of the Inverter functions.Amongthe electronic components, there aresomethat require maintenance dependingontheir usage conditions.In order to keep the Inverter operating normally over a long period of time, it is necessary to performperiod inspections and replace parts according to their service life.Periodic inspection standards vary depending the Inverter's installation environment and usage conditions.The Inverter's maintenance periods are noted below. Keep them as reference.

Part Replacement Guidelines

Part	Standard Replacement Period	Replacement Method
Cooling fan	5 years	Replace with new part.
Smoothing capacitor	5 years	Replace with new part. (Determine need by inspection.)
Breaker relays	—	Determine need by inspection.
Fuses	5 years	Replace with new part.
Aluminum capacitors on PCBs	5 years	Replace with new board. (Determine need by inspection.)

Note Usage conditions are as follows:
- Ambient temperature: Yearly average of 30°C
- Load factor: 80% max.
- Operating rate: 12 hours max. per day

8 Specifications

8.1 Standard Inverter Specifications

Model number YD3***T4N		1P5	2P2	3P7	5P5	7P5	011	015	018	022	030	037	045	055	075	093	110	132	160	185	200	220	250	280	315	355	400	450	500	560	630
Max. applicable motor output*1(kW)		1. 5	2. 2	3. 7	5. 5	7. 5	11	15	18. 5	22	30	37	45	55	75	93	110	132	160	185	200	220	250	280	315	355	400	450	500	560	630
Output ratings	Rated output capacity (kVA)	3. 7	4. 7	6. 1	11	14	21	26	31	37	50	61	73	98	130	140	170	200	230	260	300	340	380	430	460	490	519	585	650	722	780	
	Rated output current (A)	4. 8	6. 2	8	14	18	27	34	41	48	65	80	96	128	165	180	224	260	302	340	380	450	470	530	605	670	738	864	984	1100	1185	
	Max. output voltage (V)	3-phase, 380/400/415/460VAC (Proportional to input voltage.)																														
	Rated output frequency (Hz)	Up to 400 Hz (available by programming)																														
Power supply characteristics	Voltage (V) Frequency (Hz)	3-phase, 380/400/415/460 VAC, 50/60 Hz																														
	Allowable voltage fluctuation	+10%, −15%																														
	Allowable frequency fluctuation	± 5%																														
Control characteristics	Control method	Sine wave PWM																														
	Torque characteristics	150% at 1 Hz (150% at 0 r/min with PG).*2																														
	Speed control range	1: 100 (1: 1000 with PG)*2																														
	Speed control accuracy	± 0.2% (25°C ± 10 °C) (± 0.02% with PG)*2																														
	Speed control response	5 Hz (30 Hz with PG)*2																														
	Torque limits	Provided (4 quadrant steps can be changed by constant settings.)																														
	Torque accuracy	± 5%																														
	Frequency control range	0.1 to 400 Hz																														
	Frequency accuracy (temperature charac Digital references: ± 0.01% (−10°C to +40°C) ntrol c characteristics)	Digital references: ± 0.01% (−10°C to +40°C) Analog references: ± 0.1% (25°C ± 10 °C)																														
	Frequency setting resolution	Digital references: 0.01 Hz Analog references: 0.03 Hz/60 Hz (11 bits + sign)																														
	Output frequency resolution	0.001 HzJ																														
	Overload capacity	150% of rated current for one minute																														
	Frequency setting signal	−10 to 10 V, 0 to 10 V, 4 to 20 mA																														
	Acceleration/ Deceleration time	0.01 to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)																														
	Braking torque	Approximately 20%																														
Protective funcctions	Motor protection	Protection by electronic thermal overload relay.																														
	Instantaneous over −current protection	Stops at approx. 200% of rated output current.																														
	Fuse blown protection	Stops for fuse blown.																														
	Overload protection	Stops in one minute at approx. 150% of rated output current.																														
	Overvoltage protection	Stops when main-circuit DC voltage is approx. 406 V.																														
	Undervoltage protection	Stops when main-circuit DC voltage is approx. 190 V.																														
	Momentary power loss ridethru	Stops for 15 ms or more. By selecting the momentary power loss mode, operation can be continued if power is restored within 2 s.																														
	Cooling fin overheating	Protection by thermistor.																														
	Stall prevention	Stall prevention during acceleration, deceleration, or running																														
	Grounding protection	Protection by electronic circuits. (Overcurrent level)																														
	Charge indicator (internalLED)	Lit when the main circuit DC voltage is approx. 50 V or more.																														
Environment	Ambient operating temperature	−10° to 40°C (Enclosed wall-mounted type) 10° to 45°C (Open chassis type)																														
	Ambient operating humidity	90 % RH max.																														
	Storage temperature	−20 °C to +60 °C																														
	Application site	Indoor (no corrosive gas, dust, etc.)																														
	Altitude	1000 m max.																														
	Vibration	10 to 20 Hz, 9.8 m/s2 (1G) max.; 20 to 50 Hz, 2 m/s2 (0.2G) max																														

* 1. The maximum applicable motor output is given for a standard 4-pole Yaskawa motor.
When selecting the actual motor and Inverter, be sure that the Inverter's rated current is applicable for the motor's rated current.

* 2. Tuning is sometimes required.

8.2 Option Cards Specifications

The following Option Cards are available.

Option Cards

Type	Descriptions
RS-232C/485/422 Interface Card SI-K2	Used to convert RS-232C to RS-485 or RS-422. Supports baud rates up to 9.6 kbps. SPEC: F and later versions support baud rates up to 19.2 kbps.

Optional Cards (Continued)

Type		Name	Descriptions
Built-in (connect to connector)	PG Speed Co Control Cards	PG-A2	Used for V/f control. Speed feedback is performed using the PG attached to the motor to compensate for speed fluctuations caused by slipping. A-phase pulse (single pulse) input (voltage, complementary, open-collector input) Maximum input frequency: 32767 Hz Pulse monitor output: +12 V, 20 mA (PG power supply output: +12 V, 200 mA max.)
		PG-B2	Used for flux vector control. A-, B-phase input (complimentary input) Maximum input frequency: 32767 Hz Pulse monitor output: Open-collector (PG power supply output: +12 V, 200 mA max.)
		PG-D2	Differential input. S A-phase pulse (differential pulse) input, for V/f control Maximum input frequency: 300 kHz Input: Conforms to RS-422 Pulse monitor output: RS-422 (PG power supply output: +5 or +12 V, 200 mA max.)
		PG-X2	Used for flux vector control. S A-, B-, Z-phase pulse (differential pulse) input Maximum input frequency: 300 kHz Input: Conforms to RS-422 Pulse monitor output: RS-422 (PG power supply output: +5 or +12 V, 200 mA max.)
		Synchronous Phase Control Card SP-A2	Connector to Inverter to enable synchronized startup control with the motor. An external voltage detection transformer (CPT005845) is required.

9 Appendix

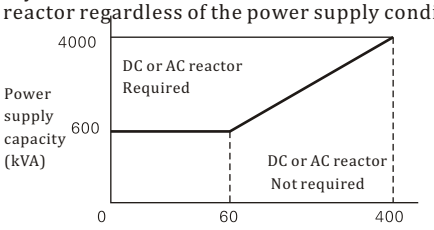
9.1 Inverter Application Precautions

9.1.1 Selection

■ Installing Reactors

A large peak current will flow in the power input circuit when the Inverter is connected to a large-capacity power transformer (600kVAor higher) orwhenswitching a phase capacitor. Excessive peak current can destroy the convertor section.Toprevent this, installaDCorACreactor (optional) toimprovethepowersupply power factor.

DCreactors are built into 200Vclass Inverters of 18.5 to 75kWand 400Vclass Inverters of 18.5 to 160 kW. If a thyrister convertor, such as aDC drive, is connected in the same power supply system, connect a DC or AC reactor regardless of the power supply conditions shown in the following diagram.



■ Inverter Capacity

When connecting special motors or multiple motors in parallel to an Inverter, select the Inverter capacity so that the rated output current of the Inverter is 1.1 times the sum of all the motor rated currents.

■ Initial Torque

The startup and acceleration characteristics of the motor are restricted by the overload current ratings of theInverter that is driving themotor.Thetorque characteristics are generally lessthan those requiredwhenstartingusing a normal commercial power supply. If a large initial torque is required, select an Inverter with asomewhat larger capacity or increase the capacity of both the motor and the inverter.

■ Emergency Stop

Although the Inverter's protective functions will stop operation when a fault occurs, the motor will not stop immediately.Alwaysprovide mechanical stopandprotectionmechanismsonequipmentrequiringanemergency stop.

■ Options

Terminals B1, B2, ©, ¨1, ¨2, ¨3 are for connecting only the options specifically provided byYaskawa. Never connect any other devices to these terminals.

9.1.2 Installation

■ Installation in Enclosures

Eitherinstallthe Inverter inacleanlocationnotsubjectto oil mist, air-bournematter, dust,andothercontaminants, or install the Inverter in a completely enclosed panel. Provide cooling measures and sufficient panel space so that the temperature surrounding the Inverter does notgo beyondthe allowable temperature.Donot install the Inverter on wood or other combustible materials.

■ Installation Direction

Mount the Inverter vertically to a wall or other horizontal surface.

9.1.3 Settings

■ Upper Limits

The Digital Operator can be used to set high-speed operation up to a maximum of 400 Hz. Incorrect settings can be dangerous. Use the maximum frequency setting functions to set upper limits. (The maximum output frequency is factory-set to 60 Hz.)

■ DC Injection Braking

The motor can overheat if the DC injection braking voltage or braking time is set to a large value.

■ Acceleration/Deceleration Times

The motor's acceleration and deceleration times are determined by thetorque generated by the motor, the load torque, and the load's inertial moment (GD2/4). If the stall prevention functions are activated during accelerationordeceleration,increasetheaccelerationordecelerationtime.Thestallpreventionfunctionswill increase the acceleration or deceleration time by the amount of time the stall prevention function is active. To reduce the acceleration or deceleration times, increase the capacity of the motor and Inverter.

9.1.4 Handling

■ Wiring Check

The Inverter will be internally damaged if the power supply voltage is applied to output terminal U,V, orW. Check wring for any mistakes before supplying power. Check all wiring and sequences carefully.

■ Magnetic Contactor Installation

Donot start and stop operation frequently with a magnetic contactor installed on the power supply line. Doing so can cause the Inverter to malfunction.

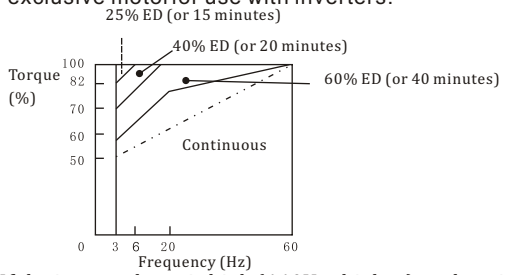
■ Inspections

The internal capacitors in the Inverter require time to discharge after the power supply is turnedOFF. Do not start inspections until the CHARGE indicator goes out.

9.2 Motor Application Precautions

9.2.1 Using the Inverter for an Existing Standard Motor

When a standard motor is operated with the Inverter, power loss is slightly higher than when operated witha commercial power supply. In addition, cooling effects also diminish in the low-speed range, resulting inan increase in the motor temperature. Therefore, the motor torque should be reduced in the low-speed range.The following graph shows the allowable load characteristics of a standard motor.If100%torque is continuously required in the low-speed range, use a special motor or vector -exclusive motorfor use with inverters.



If the input voltage is high (440Vor higher) or the wiring distance is long, the motor insulation voltage mustbe considered. Contact your Yaskawa representative for details.

■ High-speed Operation

When using the motor at a high speed (60 Hz or more), problems may arise in dynamic balance and bearingdurability. Contact your Yaskawa representative for details.

■ Torque Characteristics

Torque CharacteristicsThe motormayrequire more acceleration torque whenthe motor is operated with the Inverter than whenoperatedwith a commercial power supply. Check the load torque characteristics of the machine to be used withthe motor to set a proper V/f pattern.

■ Vibration

The Inverter uses a high carrierPWMto reduce motor vibration.Whenthe motor is operated with the Inverter,motor vibration is almost the same as when operated with a commercial power supply. Motor vibration may, however, become greater in the following cases.

Resonance with the Natural Frequency of the Mechanical SystemTakes pecial care when a machine that has been operate data constantspeedis tobeoperatedin variablespeedmode. If resonance occurs, install vibration-proof rubber on the motor base or use the frequency jumpfunction toskip any frequency resonating the machine.Imbalanced Rotor Take special care when the motor is operated at a higher speed (60 Hz or more).

■ Noise

Noise is almost the same as when the motor is operated with a commercial power supply. Motor noise, however,becomes louder when the motor is operated at a speed higher than the rated speed (60 Hz).

9.2.2 Using the Inverter for Special Motors

■ Pole-changing Motor

The rated input current of pole-changing motors differs from that of standard motors. Select, therefore, anappropriate Inverter according to the maximum input current of the motor to be used.Before changing the number of poles, always make sure that the motor has stopped. Otherwise, the overvoltage protective or overcurrent protective mechanism will be actuated, resulting in an error.

■ Submersible Motor

Therated input current ofsubmersiblemotorsishigher thanthat ofstandard motors.Therefore,alwaysselectan Inverter by checking its rated output current. Whenthe distance between the motor and Inverter is long, use a cable thick enough to connect the motor andInverter to prevent motor torque reduction.

■ Explosion-proof Motor

When an explosion-proof motor or increased safety-type motor is to be used, it must be subject to an explosion-proof test in conjunction withthe Inverter.This is also applicablewhenanexisting explosion -proofmotor is to be operated with the Inverter.Since the Inverter itself is, however, not explosion-proof , always install it in a safe place.

■ Gearmotor

Thespeedrange forcontinuous operation differs accordingto the lubricationmethodandmotormanufacturer. Inparticular, continuous operation ofanoil-lubricatedmotorin thelowspeedrangemayresult in burning. If the motor is to be operated at a speed higher than 60 Hz, consult with the manufacturer.

■ Synchronous Motor

A synchronous motor is not suitable for Inverter control. If a group of synchronous motors is individually turned ON and OFF, synchronism may be lost.

■ Single-phase Motor

Do not use an Inverter for a single-phase motor. The motor should be replaced with a 3-phase motor.

9.2.3 Power Transmission Mechanism (Speed Reducers, Belts, and Chains)

If an oil-lubricated gearbox or speed reducer is used in the power transmission mechanism, oil lubrication will be affected when the motor operates only in the low speed range. The power transmission mechanism will make noise and experience problems with service life and durability if the motor is operated at a speed higher than 60 Hz.

9.3 Peripheral Device Application Precautions

If an oil-lubricated gearbox or speed reducer is used in the power transmission mechanism, oil lubrication will be affected when the motor operates only in the low speed range. The power transmission mechanism will make noise and experience problems with service life and durability if the motor is operated at a speed higher than 60 Hz.

Using Magnetic Contactors on the Power Supply Line

TheInvertercanbeusedwithoutamagneticcontactoronthepowersupplyline.Althoughamagneticcontactor can be installed to protect from accidents that can occur by automatic recovery following power losses during remote operation, do not start and stop operation frequently with a magnetic contactor installed on the power supply line. Doing so can cause the Inverter to malfunction. The motor will not be automatically restartedafterpowerrecoveryduringDigitalOperatoroperation,andstartingviaamagneticcontactoristhus not possible.

Althoughoperationcanbestoppedusingamagneticcontactor in thepowersupplyline, the regenerativecontrol of the Inverter will not operate and a coast to a stop will occur. If a Braking Unit or Braking Resistor Unit is used, wire a sequencethat turnsOFFthe magnetic contactor with the thermalprotector contact of theBraking Resistor Unit.

Using Magnetic Contactors on the Motor Line

As a rule, so not install a magnetic contactor between the Inverter and motor to turn the motorONand OFF during operation. Supplying power to the motor while the Inverter is operating will cause a large surge current to flow, and the Inverter's overcurrent protection function will operate. If a magnetic contactor is installed to switch to a commercial power supply, switch the lines only after stopping both the Inverter and the motor. Use the speed search function is switching is required while the motor shaft is rotating. If a magnetic contactor is required for momentary power losses, use a contactor with delayed operation.

Installing Thermal Overload Relays

The Inverter has a protection function using an electronic thermal to protect the motor from overheating. However, if more than one motor is operated from one Inverter or if a multi-pole motor is operated, install thermal overload relays or thermal protectors between the Inverter and motors. Set the constant L1-01 to "0" and set the heat-operating thermal overload relay or thermal protector to 1.0 times the value on the motor nameplate at 50 Hz or 1.1 times the value at 60 Hz.

Improving the Power Factor (Eliminating Phase Advancing Capacitors)

Install aDCorACreactor on the power supply line to the Inverter to improve the power factor. (200Vclass Inverters of 18.5 to 75kW and 400 V class Inverters of 18.5 to 160kW have built-in DC reactors.) Capacitors or surge suppressorsonthe output line from the Inverter can overheat or be destroyed bythe highfrequencycomponentof the Inverter's output.Theycan also cause overcurrents to flow to the Inverter, causingthe overcurrent protectionfunction to activate.Donot installcapacitors orsurgesuppressorsin theoutputline.

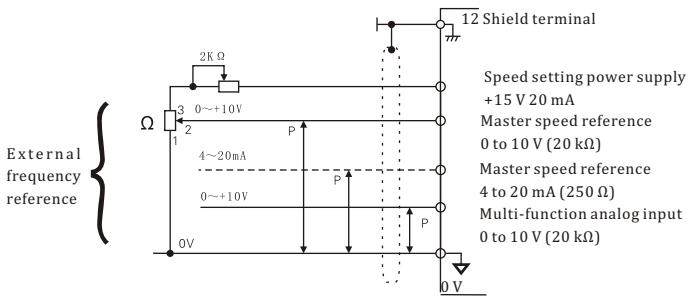
Electromagnetic Interference

The Inverter's I/O circuits (main circuits) contain a high-frequency component, whichmayadversely affect communications devices (e.g., AM radios) located nearby. This interference can be reduced by installing noise filters, or you can install the wiring between the Inverter and motor and the power supply wiring in a metal duct and ground the duct.

Wire Sizes and Distances

Motor torque will be reduced by voltage drop along the cable if the distance between the Inverter and the motor is too long. This is particularly noticeable for low-frequency outputs. Use wires of sufficient size. Always use the optional extension cables when operating the Digital Operator separated from the Inverter. For remote operation using analog signals, keep the control line length between the Analog Operator or operation signals and the Inverter to 50mor less, and separate the lines from high-power lines (main circuits or relay sequence circuits) to reduce induction from peripheral devices.

Whensetting frequencies from an external frequency setter (and not from a Digital Operator), used shielded twisted-pair wires and ground the shield to terminal 12, as shown in the following diagram.



9.4 Installing and Wiring PG Speed Control Cards

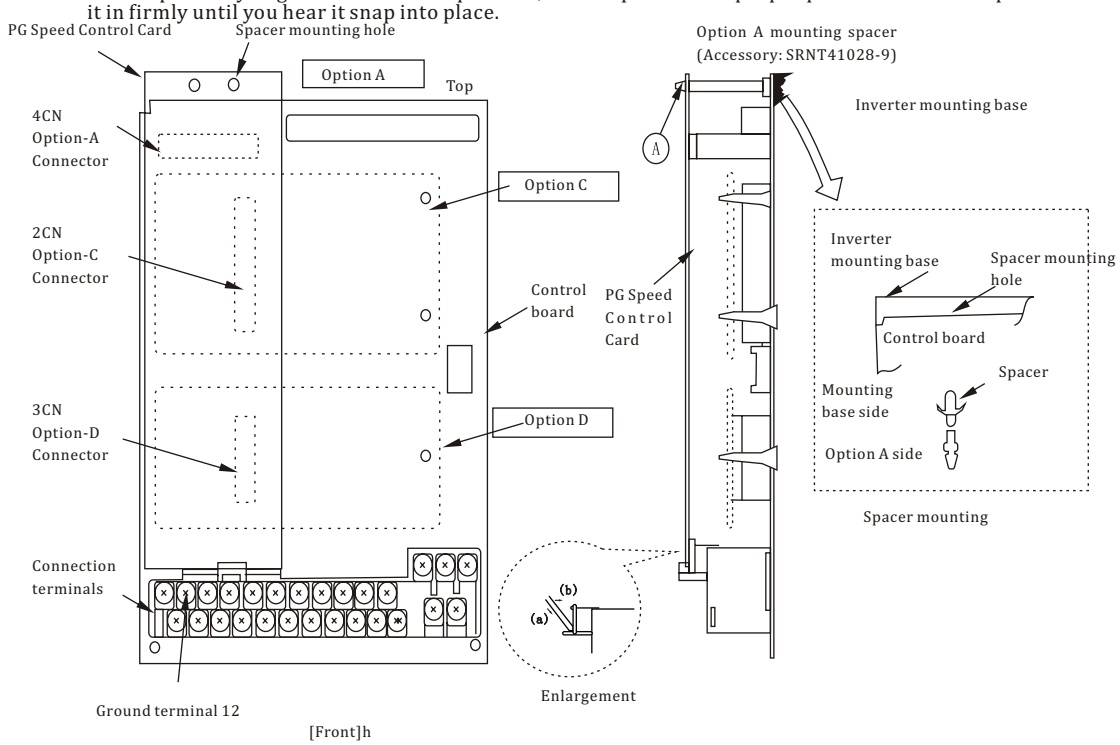
PG Speed Control Cards are used for executing speed control using a pulse generator (PG). There are four typesof PG speed control, as shown below. Select the type that fits the application and control method.

PG-A	A-phase (single) pulse input for open collector output or complementary outputs, for V/f control
PG-B	A/B-phase pulse input for open collector output or complementary outputs, for vector control
PG-D	A-phase (single) pulse input for line driver input, for V/f control
PG-X	A/B/Z-phase pulse input for line driver input, for vector control

9.4.1 Installing a PG Speed Control Card

Use the following procedure to install a PG Speed Control Card.

1. Turn off the main-circuit power supply.
2. Leave it off for at least one minute before removing the front cover of the Inverter (or at least threminutes for Inverters of 30 kW or more). Check to be sure that the CHARGE indicator is OFF.
3. Insert the spacer (which is provided) into the spacer hole in the Inverter's mounting base.For Inverters of 3.7 kW or lower, there are two adjacent holes. Insert the spacer into the 7CN hole. Thespacer cannot be easily removed if inserted into the wrong hole. Be very careful to insert the spacer into the correct hole, and in the proper direction.
4. Referring to the enlarged illustration in the following diagram, align the PG Speed Control Card with the catch position as shown by (a) and (b) and fit it precisely to the Option-A connector. Insert at (a) first.
5. Pass the spacer through the spacer hole at the Card. (Refer to A in the illustration.) Check to be sure that it is precisely aligned with the 4CN position, and snap it into the proper position. Be sure to press it in firmly until you hear it snap into place.



Installing a PG Speed Control Card

9.4.2 PG Speed Control Card Terminal Blocks

The terminal specifications for each PG Speed Control Card are given in the following tables.

■ PG-A2 (For V/f with PG Feedback Mode Only)

PG-A2 Terminal Specifications

Terminal	No.	Contents	Specifications
TA1	1	Power supply for pulse generator	12 VDC (±5%), 200 mA max.
	2		0 VDC (GND for power supply)
	3	+12 V/open collector switching ter-minal	Terminal for switching between12 V voltage input and open collector input For open collector inputshort across 3 and 4.
	4		
	5	Pulse input terminal	H: +4 to 12 V; L: +1 V max. (Maximum response frequency: 30 kHz)
	6		Pulse input common
	7	Pulse motor output terminal	12 VDC (+10%), 20 mA max.
	8		Pulse monitor output common
TA2	(E)	Shield connection terminal	——

■ PG-B2 (For Flux Vector Control Mode Only)

PG-B2 Terminal Specifications

Terminal	No.	Contents	Specifications
TA1	1	Power supply for pulse generator	12 VDC (±5%), 200 mA max.
	2		0 VDC (GND for power supply)
	3	A-phase pulse input terminal	H: +8 to 12 V L: +1 V max. (Maximum response frequency: 30 kHz)
	4		Pulse input common
	5	B-phase pulse input terminal	H: +8 to 12 V L: +1 V max. (Maximum response frequency: 30 kHz)
	6		Pulse input common
TA2	1	A phase monitor output terminal	Open collector output, 24 VDC, 30 mA max.
	2		A-phase monitor output common
	3	B phase monitor output terminal	Open collector output, 24 VDC, 30 mA max.
	4		B-phase monitor output common
TA3	(E)	Shield connection terminal	——

■ PG-D2 (For V/f with PG Feedback Mode Only)

PG-D2 Terminal Specifications

Terminal	No.	Contents	Specifications
TA1	1	Power supply for pulse generator	12 VDC (±5%), 200 mA max. (see note)
	2		0 VDC (GND for power supply)
	3		5 VDC (±5%), 200 mA max. (see note)
	4	Pulse input + terminal	Line driver input (RS-422 level input) Maximum response frequency: 300 kH
	5	Pulse input – terminal	
	6	Common terminal	——
	7	Pulse monitor output + terminal	Line driver output (RS 422 level output)
	8	Pulse monitor output – terminal	
TA2	(E)	Shield connection terminal	——

Note 5 VDC and 12 VDC cannot be used at the same time.

■ PG-X2 (For Flux Vector Control Mode Only)

PG-X2 Terminal Specifications

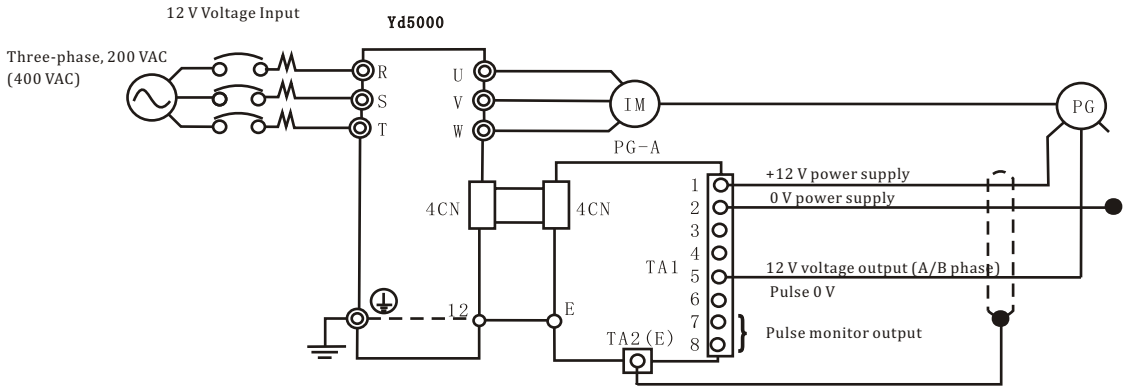
Terminal	No.	Contents	Specifications
TA1	1	Power supply for pulse generator	12 VDC (±5%), 200 mA max. (see note)
	2		0 VDC (GND for power supply)
	3		5 VDC (±5%), 200 mA max. (see note)
	4	A-phase + input terminal	Line driver input (RS-422 level input)Maximum response frequency: 300 kHz
	5	A-phase – input terminal	
	6	B-phase + input terminal	
	7	B-phase – input terminal	
	8	Z-phase + input terminal	
	9	Z-phase – input terminal	
	10	Common terminal	0 VDC (GND for power supply)
TA2	1	A-phase + output terminal	Line driver output (RS 422 level output)
	2	A-phase – output terminal	
	3	B-phase + output terminal	
	4	B-phase – output terminal	
	5	Z-phase + output terminal	
	6	Z-phase – output terminal	
	7	Control circuit common	Control circuit GND
TA3	(E)	Shield connection terminal	——

Note 5 VDC and 12 VDC cannot be used at the same time.

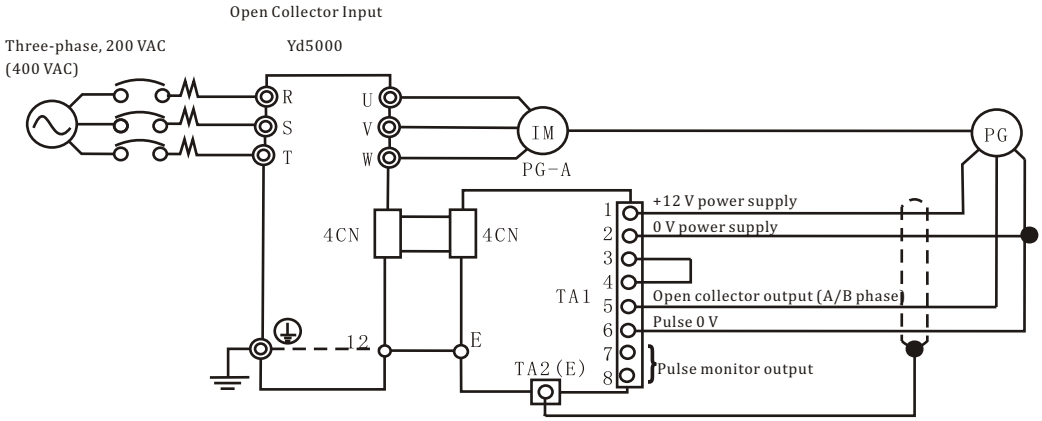
9.4.3 Wiring a PG Speed Control Card

Wiring examples are provided in the following illustrations for the PG Speed Control Cards.

PG-A2 (For V/f with PG Feedback Mode Only)

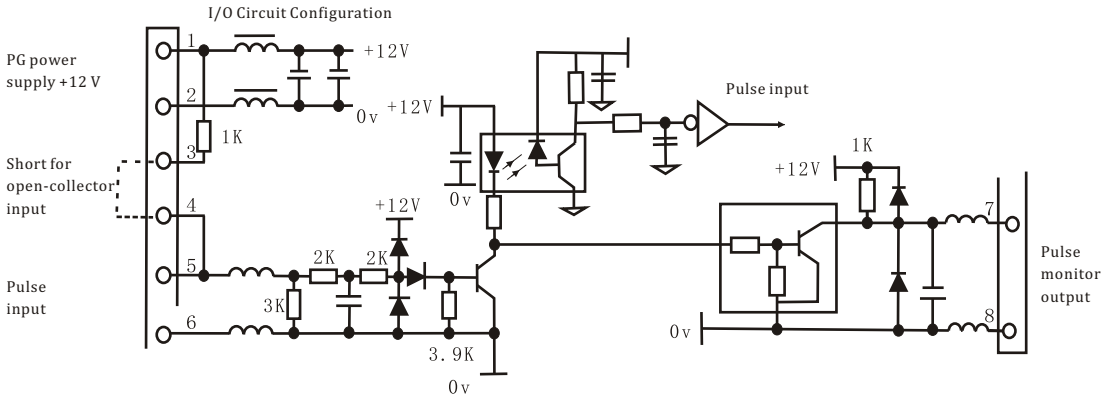


Wiring a 12 V Voltage Input



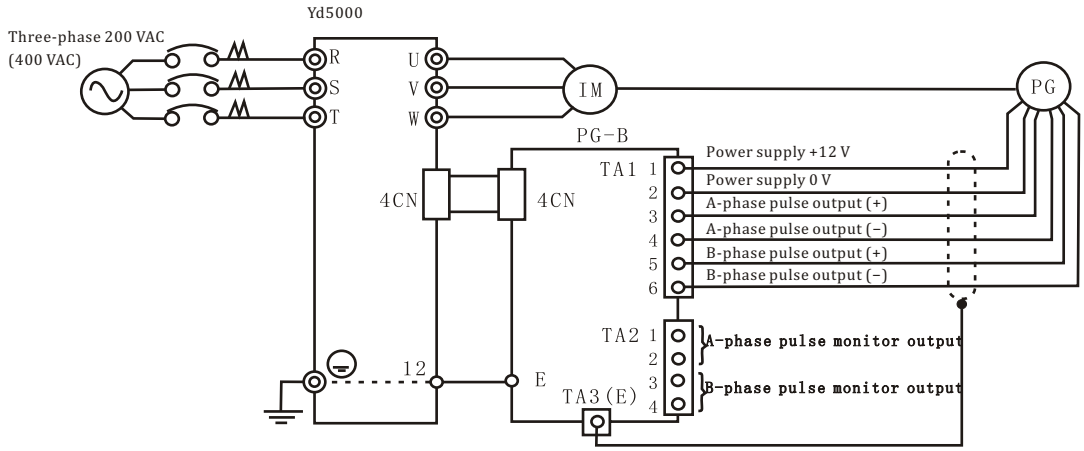
- Shielded twisted-pair wires must be used for signal lines.
- Do not use the pulse generator's power supply for anything other than the pulse generator (encoder). Using it for another purpose can cause malfunctions due to noise.
- The length of the pulse generator's wiring must not be more than 100 meters.

Wiring an Open-collector Input



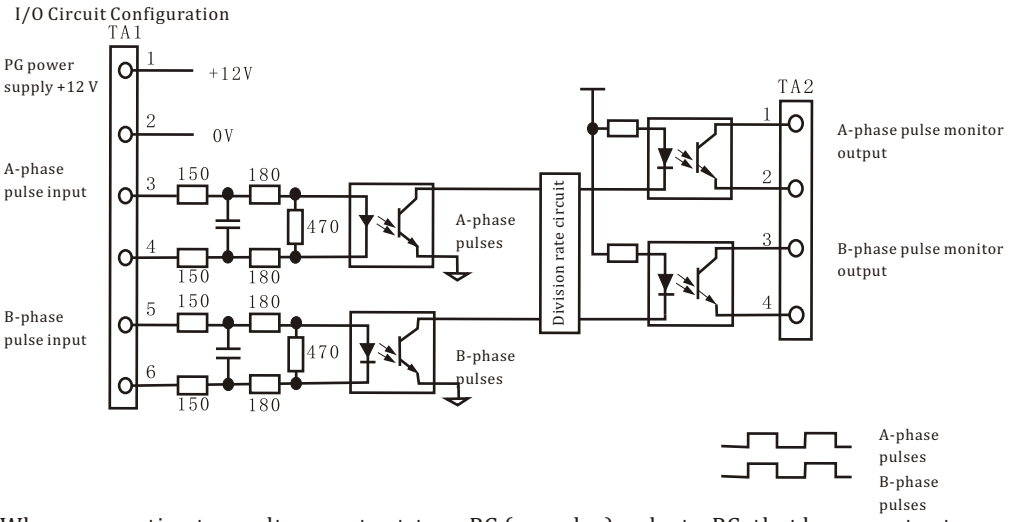
I/O Circuit Configuration of the PG-A2

■ PG-B2 (For Flux Vector Control Mode Only)



- Shielded twisted-pair wires must be used for signal lines.
- Do not use the pulse generator's power supply for anything other than the pulse generator (encoder). Using it for another purpose can cause malfunctions due to noise.
- The length of the pulse generator's wiring must not be more than 100 meters.
- The direction of rotation of the PC can be set in user constant F1-05. Thefactory preset if for forward rotation, A-phase advancement.

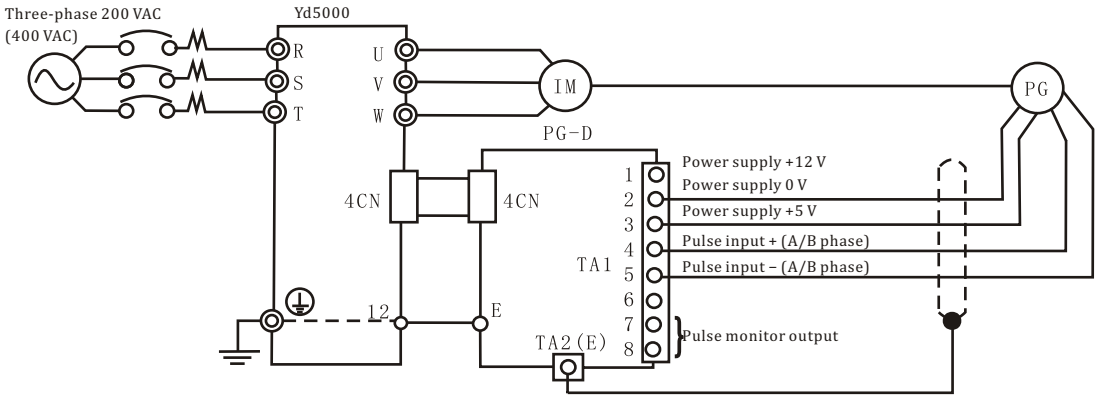
PG-B2 Wiring



- When connecting to a voltage-output-type PG (encoder), select a PG that has an output impedance with a current of at least 12 mA to the input circuit photocoupler (diode).
- The pulse monitor dividing ratio can be changed using constant

I/O Circuit Configuration of the PG-B2

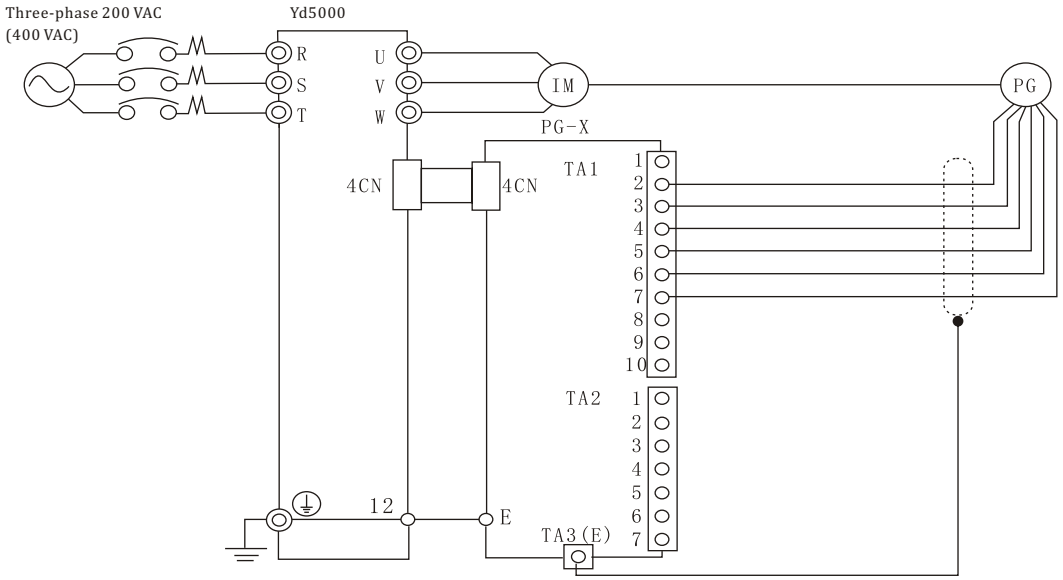
■ PG-D2 (For V/f with PG Feedback Mode Only)



- Shielded twisted-pair wires must be used for signal lines.
- Do not use the pulse generator's power supply for anything other than the pulse generator (encoder). Using it for another purpose can cause malfunctions due to noise.
- The length of the pulse generator's wiring must not be more than 100 meters.

PG-D2 Wiring

■ PG-X2 (For Flux Vector Control Mode Only)



- Shielded, twisted-pair wire must be used for signal lines.
- Do not use the pulse generator's power supply for anything other than the pulse generator (encoder) . Using it for another purpose can cause malfunctions due to noise.
- The length of the pulse generator's wiring must not be more than 100 meters.
- The direction of rotation of the PC can be set in user constant F1-05. The factory preset if for forward rotation, A-phase advancement.

PG-X2 Wiring

9.4.4 Wiring PG Speed Control Card Terminal Blocks

Use no more than 100 meters of wiring for PG (encoder) signal lines, and keep them separate from power lines.

Use shielded, twisted-pair wires for pulse inputs and pulse output monitor wires, and connect the shield to the shield connection terminal.

■ **Wire Sizes (Same for All Models)**

Terminal wire sizes are shown in Table 3.14.

Table 3.14 Wire Sizes

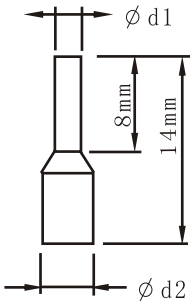
Terminal	Terminal Screws	Wire Thickness (mm2)	Wire Type
Pulse generator power supply Pulse input terminal Pulse monitor output terminal	—	Stranded wire: 0.5 to 1.25 Single wire: 0.5 to 1.25	Shielded, twisted-pair wire Shielded, polyethylene -covered vinyl sheath cable
Shield connection terminal	M3.5	0.5 to 2	

■ **Solderless Terminals for Control Circuit Terminals**

The use of solderless terminals for the control circuit terminals is recommended because solderless terminals are easy to connect securely.

Straight Solderless Terminal Sizes

Wire Thickness	Model	d1	d2	Manufacturer
0.5mm²	A10.5-8WH	1.00	2.60	Phoenix Contact
0.75 mm²	A10.75-8GY	1.20	2.80	
1 mm²	A11-8RD	1.40	3.00	
1.5 mm²	A11.5-8BK	1.70	3.50	



Straight Solderless Terminal Sizes

IMPORTANT

Do not solder wires with the control circuit terminals if wires are used instead of solderless terminals. Wires may not contact well with the control circuit terminals or the wires may be disconnected from the control circuit terminals due to oscillation if the wires are soldered

Closed-loop Connector Sizes and Tightening Torque

The closed-loop connectors and tightening torques for various wire sizes are shown in Table 3.16.

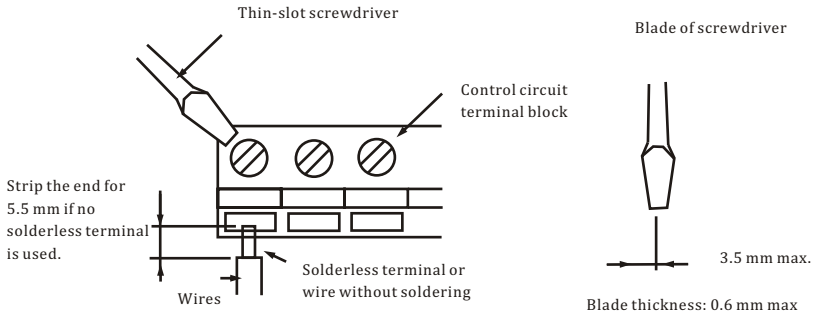
Closed-loop Connectors and Tightening Torques

Wire Thickness [mm2]	Terminal Screws	Crimp Terminal Size	Tightening Torque (N G m)
0.5	M3.5	1.25-1.35	0.8
0.75		1.25-1.35	
1.25		1.25-1.35	
2		2-3.5	

Wiring Method

Use the following procedure to connect wires to the terminal block.

1. Loosen the terminal screws with a thin-slot screwdriver.
2. Insert the wires from underneath the terminal block.
3. Tighten the terminal screws firmly.

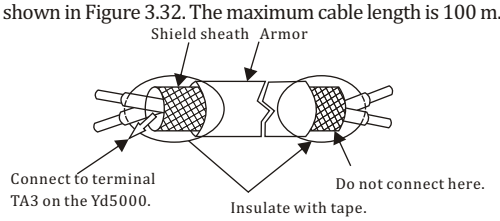


Connecting Wires to Terminal Block

Wiring Precautions

IMPORTANT

1. Separate PG Speed Control Card control circuit wiring (terminals TA1 and TA2) from main circuit wiring and other high-power lines.
2. Use twisted-pair or shielded twisted-pair cables to connect the PG to prevent operating faults. Process cable ends as shown in Figure 3.32. The maximum cable length is 100 m.



Processing the Ends of Twisted-pair Cables

3. Connect the shield to the ground terminal.
4. Do not solder the wires to the control circuit terminals. The wires may not contact well wit h the control circuit terminals if the wires are soldered.
5. The end of each wire connected to the control circuit terminals must be stripped for approximately 5.5 mm.

9.4.5 Selecting the Number of PG (Encoder) Pulses

PG-A2/PG-B2

The maximum response frequency is 32,767 Hz.

Use a PGthat outputs a maximum frequency of approximately 20 kHz for the rotational speed of the motor.

$$\frac{\text{Motor speed at maximum frequency output (r/min)}}{60} \times \text{PG rating (p/rev)} = 20,000\ \text{Hz}$$

Some examples of PG output frequency (number of pulses) for the maximum frequency output are shown in Table 3.17.

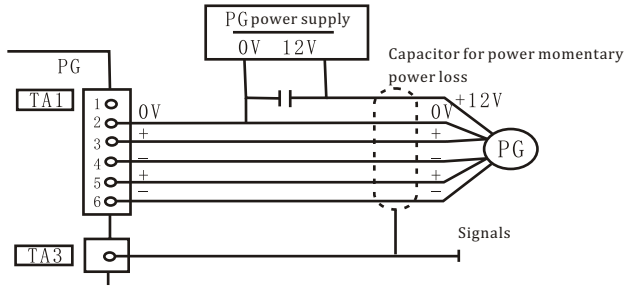
PG Pulse Selection Examples

Motor's Maximum Speed (r/min)	PG Rating (p/rev)	PG Output Frequency for Maximum Frequency Output (Hz)
1800	600	18,000
1500	800	20,000
1200	1000	20,000
900	1200	18,000

Note 1.The motor speed at maximum frequency output is expressed as the sync rotation speed.

2. The PG power supply is 12 V.

3. A separate power supply is required if the PG power supply capacity is greater than200 mA. (If momentary power loss must be handled, use a backup capacitor or othermethod.)



PG-B2 Connection Example

PG-D2/PG-X2

There are 5 V and 12 V PG power supplies.

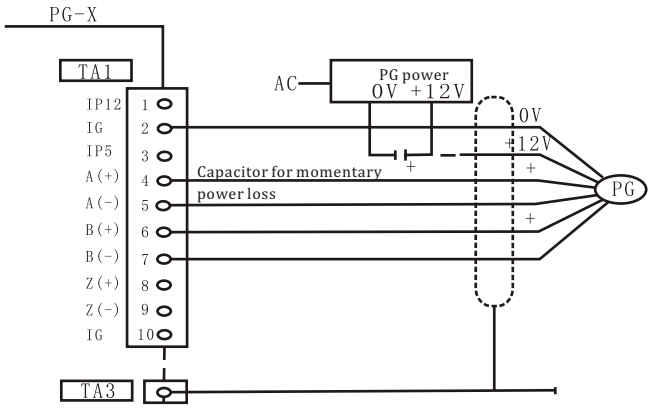
Check the PG power supply specifications before connecting.

The maximum response frequency is 300 kHz.

Use the following equation to computer the output frequency of the PG (fPG).

$$\frac{\text{Motor speed at maximum frequency output (r/min)}}{60} \times \text{PG rating (p/rev)}$$

A separate power supply is required if the PG power supply capacity is greater than 200 mA. (If momentary power loss must be handled, use a backup capacitor or other method.)



PG-X2 Connection Example (for 12 V PG power supply)

No.	Name (Display)	Factory Setting	Setting	No.	Name (Display)	Factory Setting	Setting
A1-00	Language selection for digital operator display (Select Language)	0~6		b5-07	PID offset adjustment (PID Offset)	-100.0 +100.0	
A1-01	Constant access level (Access Level)	0~4		b5-08	PID primary delay time constant (PID Delay Time)	0.00~10.0	
A1-02	Control method selection (Control Method)	0~3		b5-09	PID output characteristics selection (Output Level Sel)	0~1	
A1-03	Initialize (Init Parameters)	0~3330		b5-10	PID output gain (Output Gain)	0.0~25.0	
A1-04	Password 1 (Enter Password)	0~9999		b5-11	PID reverse output selection (Output Rev Sel)	0~1	
A1-05	Password 2 (Select Password)	0~9999		b5-12	Selection of PID feedback command loss detection (Fb los Det Sel)	0~2	
A2-01 ~ A2-32	User setting constant (User Pram 1 to 32)	b1-01 ~ o2-08		b5-13	PID feedback command loss detection level (Fb los Det Lvl)	0~100	
b1-01	Reference selection (Reference Source)	0~4		b5-14	PID feedback command loss detection time (Fb los Det Time)	0.0~25.5	
b1-02	Operation method selection (Run Source)	0~4		b6-01	Dwell frequency at start (Dwell Ref @ Start)	0.0~400.0	
b1-03	Stopping method selection (Stopping Method)	0~3		b6-02	Dwell time at start (Dwell Time @ Start)	0.0~10.0	
b1-04	Prohibition of reverse operation (Reverse Oper)	0. 1		b6-03	Dwell frequency at stop (Dwell Ref @ Stop)	0.0~400.0	
b1-05	Operation selection for setting of E1-09 or less (Zero-Speed Oper)	0~3		b6-04	Dwell time at stop (Dwell Time @ Stop)	0.0~10.0	
b1-06	Read sequence input twice (Cntl Input Scans)	0. 1		b7-01 *2	Droop control gain:2 (Droop Gain)	0.0~100.0	
b1-07	Operation after switching to remote mode:2 (LOC/REM RUN Sel)	0. 1		b7-02 *2	Droop control delay time:2 (Droop Delay Time)	0.03~2.00	
b1-08	Run command selection for PRG mode (RUN CMD at PRG)	0. 1		b8-01	Energy-saving gain (Energy Save Gain)	0~100	
b2-01	Zero speed level (DC injection braking start frequency)(DCInj Start Rreq)	0.0~10.0		b8-02	Energy-saving frequency (Energy Save Freq)	0.0~400.0	
b2-02	DC injection braking current (DCinj Current)	0~100		b9-01	Zero-servo gain (Zero Servo Gain)	0~100	
b2-03	DC injection braking time at start (DCInj Time @ Start)	0.00~10.00		b9-02	Zero-servo completion width (Zero Servo Count)	0~16383	
b2-04	DC injection braking time at stop (DCInj Time @ Stop)	0.00~10.00		c1-01	Acceleration time 1 (Accel Time 1)		
b2-08	Magnetic flux compensation volume (Field Comp@ Start)	0~500		c1-02	Deceleration time 1 (Decel Time 1)		
b3-01	Speed search selection at start (SpdSrch at Start)	0. 1		c1-03	Acceleration time 2 (Accel Time 2)		
b3-02	Speed search operating current (SpdSrch Current)	0~200		c1-04	Deceleration time 2 (Decel Time 2)		
b3-03	Speed search deceleration time (SpdSrch Dec Time)	0.1~10.0		c1-05	Acceleration time 3 (Accel Time 3)	0.0~6000.0	
b4-01	Speed search deceleration time (SpdSrch Dec Time)	0.0~300.0		c1-06	Deceleration time 3 (Decel Time 3)		
b4-02	Timer function OFF-delay time (Delay-OFF Timer)	0.0~300.0		c1-07	Acceleration time 4 (Accel Time 4)		
b5-01	PID control mode selection (PID Mode)	0~4		c1-08	Deceleration time 4 (Decel Time 4)		
b5-02	Proportional gain (P) (PID Gain)	0.00~25.00		c1-09	Emergency stop time (Fast Stop Time)		
b5-03	ntegral (I) time (PID I Time)	0.0~360.0		c1-10	Accel/decel time setting unit (Acc/Dec Units)	0. 1	
b5-04	Integral (I) limit (PID I Limit)	0.0~100.0		c1-11	Accel/decel time switching frequency (Acc/Dec SW Freq)	0.0~400.0	
b5-05	Differential (D) time (PID D Time)	0.00~10.00		c2-01	S-curve characteristic time at acceleration start (Scrv Acc @ Start)	0.0~2.50	
b5-06	PID limit (PID Limit)	0.0~100.0		c2-02	S-curve characteristic time at acceleration end(SCrv Acc @ End)	0.0~2.50	

* 1. Not initialized. (Japanese standard specifications: A1-01 = 1, A1-02 = 2)
* 2. Not displayed for some models depending on software version No.
* 3. Factory setting depends on the control method (A1-02).

User Constants (Continued)

No.	Name	Factory Setting	Setting	No.	Name	Factory Setting	Setting
c2-03	S-curve characteristic time at deceleration start (Scrv Dec @ Srat)	0.00~2.50		d1-03	Frequency reference 3 (Reference 3)	0~400.0	
c2-04	S-curve characteristic time at deceleration end (Scrv Dec @ End)	0.00~2.50		d1-04	Frequency reference 4 (Reference 4)		
c3-01	Slip compensation gain (Slip Comp Gain)	0.0~2.5		d1-05	Frequency reference 5 (Reference 5)		
c3-02	Slip compensation primary delay time (Slip Comp Time)	0~10000		d1-06	Frequency reference 6 (Reference 6)		
c3-03	Slip compensation limit (Slip Comp Limit)	0~250		d1-07	Frequency reference 7 (Reference 7)		
c3-04	Slip compensation during regeneration (Slip Comp Regen)	0.1		d1-08	Frequency reference 8 (Reference 8)		
c3-05	Flux calculation method (Flux Select)	0.1		d1-09	Jog frequency reference (Jog Reference)		
c3-06	Output voltage limited operation selection (Output V Limit)	0.1		d2-01	Frequency reference upper limit (Ref Upper Limit)	0.0~110.0	
c4-01	Torque compensation gain (Torq Comp Gain)	0.00~2.50		d2-02	Frequency reference lower limit (Ref Lower Limit)	0.0~109.0	
c4-02	Torque compensation time constant (Torq Comp Time)	0~10000		d3-01	Jump frequency 1 (Jump Freq 1)	0.0~400.0	
c4-03	Start torque compensation (forward direction) (F TorqCmp@ Start)	0.00~200.0		d3-02	Jump frequency 2 (Jump Freq 2)		
c4-04	Start torque compensation (reverse direction)(R TorqCmp@ Start)	-200.0~0.0		d3-03	Jump frequency 3 (Jump Freq 3)		
c4-05	Start torque time constant (TorqCmp Delay T)	0~200.0		d3-04	Jump frequency width (Jump Bandwidth)	0.0~20.0	
C5-01	ASR proportional (P) gain 1 (ASR P Gain 1)	0.00~300.00		d4-01	Frequency reference hold function selection (MOP Ref Memory)	0.1	
C5-02	ASR integral (I) time 1 (ASR I Time 1)	0.000~10.000		d4-02	+ - Speed limits:2 (Trim Control Lvl)	1~100	
C5-03	ASR proportional (P) gain 2 (ASR P Gain 2)	0.00~300.00		d5-01	Torque control selection (Torq Control Sel)	0.1	
C5-04	ASR integral (I) time 2 (ASR I Time 2)	0.000~10.000		d5-02	Torque reference delay time (Torq Ref Filter)	1~1000	
C5-05	ASR limit (ASR Limit)	0.0~20.0		d5-03	Speed limit selection (Speed Limit Sel)	1.2	
C5-06	ASR primary delay time (ASR Delay Time)	0.000~0.500		d5-04	Speed limit (Speed Lmt Value)	-200~+120	
C5-07	ASR switching frequency (ASR Gain SW Freq)	0.0~400		d5-05	Speed limit bias (Speed Lmt Bias)	0~120	
C5-08	ASR integral (I) limit:2 (ASR I Limit)	0~400		d5-06	Speed/torque control switching timer (Ref Hold Time)	0~1000	
c6-01	Carrier frequency upper limit (Carrier Freq Max)	2.0~15.0*2		E1-01	Input voltage setting (Input Voltage)	155~255*1	
c6-02	Carrier frequency lower limit (Carrier Freq Min)	0.4~15.0		E1-02	Motor selection (Motor Selection)	0~2	
c6-03	Carrier frequency proportional gain (Carrier Freq Gain)	00~99		E1-03	V/f pattern selection (V/F Selection)	0~F	
c7-01	Carrier frequency proportional gain (Carrier Freq Gain)	0.1		E1-04	Max. output frequency (Max Frequency)	40.0~400.0	
c7-02	Hunting prevention gain (Hunt Prev Gain)	0.00~2.50		E1-05	Max. voltage (Max Voltage)	0.0~255.0*1	
c8-08	AFR gain (AFR Gain)	0.00~10.00		E1-06	Base frequency (Base Frequency)	0.0~400.0	
c8-09	Speed feedback detection control (AFR) time:2 (AFR Time)	0~2000		E1-07	Mid. output frequency (Mid. Frequency A)	0.0~400.0	
*c8-30	Carrier frequency during autotuning:2 (Carrier in tune)	0~2		E1-08	Mid. output frequency voltage (Mid Voltage A)	0.0~255.0*1	
*d1-01	Frequency reference 1 (Reference 1)	0~400.00		E1-09	Min. output frequency (Min Frequency)	0.0~400.0	
d1-02	Frequency reference 2 (Reference 2)	0~400.00		E1-10	Min. output frequency voltage (Min Voltage)	0.0~255.0*1	

** 1. Factory setting depends on the control method (A1-02).
* 2. Not displayed for some models depending on software version No.
* 3. Setting unit and initial setting depend on Inverter capacity.
* 4. Setting for 200 V class Inverters. For 400 V class Inverters, double the value.

User Constants (Continued)

No.	Name (Display)	Factory Setting	Setting	No.	Name (Display)	Factory Setting	Setting
E1-11	Mid. output frequency 2:2 (Mid Frequency B)	0.0~400.0		F1-06	PG division rate (PG pulse monitor) (PG output Ratio)	0-132	
E1-12	Mid. output frequency voltage 2:2 Mid Voltage B)	0.0~255.0*1		F1-07	Integral value during accel/decel enable/ disable (PG Ramp PI/I Sel)	0, 1	
E1-13	Base voltage:2 (Base Voltage)	0.0~255.0*1		F1-08	Overspeed detection level (PG Overspd Level)	0-120	
E2-01	Motor rated current (Motor Rated FLA)	0.32~6.40*2		F1-09	Overspeed detection delay time (PG Overspd Time)	0.32~6.40*2	
E2-02	Motor rated slip (Motor Rated Slip)	0.00~20.00		F1-10	Excessive speed deviation detection level (PG Deviate level)	0-50	
E2-03	Motor no-load current (No-Load Current)	*3		F1-11	Excessive speed deviation detection delay time (PG Deviate Time)	0.0-10.0	
E2-04	Number of motor poles (Number of Poles)	2~48		F1-12	Number of PG gear teeth 1 (PG# Gear Teeth 1)	0-1000	
E2-05	Motor line-to-line resistance (Term Resistance)	0.000~ 65.000		F1-13	Number of PG gear teeth 2 (PG# Gear Teeth 2)		
2-06	Motor leak inductance (Lead Inductance)	0.0~40.0		F1-14	PG open-circuit detection time:1 (PGO Time)	0.0~10.0	
E2-07	Motor iron saturation coefficient 1 (Saturation Comp 1)	0.00~0.50		F2-01	Bi-polar or uni-polar input selection (AI-14 Input Sel)	0,1	
E2-08	Motor iron saturation coefficient 2 (Saturation Comp 2)	0.00~0.75		F3-01	Digital input option (DI Input)	0~7	
E2-09	Motor mechanical loss (Mechanical Loss)	0.0~10.0		F4-01	Channel 1 monitor selection (AO Ch1 Select)	1-38	
E2-10	Motor iron loss for torque compensation (Tcomp Iron Loss)	0~6553.75		F4-02	Channel I gain (AO Ch1 Gain)	0.0-2.50	
E3-01	Motor 2 control method selection:1 (Control Method)	0~3		F4-03	Channel 2 monitor selection (AO Ch2 Select)	1-30	
E4-01	Motor 2 max. output frequency:1 (V/F2 Max Freq)	40.0~400.0		F4-04	Channel 2 gain (AO Ch2 Gain)	0.0-2.50	
E4-02	Motor 2 max. voltage:1 (V/F2 Max Voltage)	0.0~255.0*1		F4-05	Channel 1 output monitor bias (AO Ch1 Bias)	-10.0~10.0	
E4-03	Motor 2 max. voltage frequency:1 (V/F2 Base Freq)	0.0~400.0		F4-06	Channel 2 output monitor bias (AO Ch2 Bias)	-10.0~10.0	
E4-04	Motor 2 mid. output frequency 1:1 (V/F2 Mid Freq)	0.0~400.0		F5-01	Channel 1 output selection (DO-02 Ch1 Select)	0.0-37	
E4-05	Motor 2 mid. output frequency voltage 1:1 (V/F2 Mid Voltage)	0.0~255.0*1		F5-02	Channel 2 output selection (DO-02 Ch2 Select)	0.0-37	
E4-06	Motor 2 min. output frequency (V/F2 Min Freq)	0.0~400.0		F6-01	Output mode selection (DO-08 Selection)	0, 1	
E4-07	Motor 2 min. output frequency voltage:1 (V/F2 Min Voltage)	0.0~255.0*1		F7-01	Frequency multiple selection (PO-36F Selection)	-4	
E5-01	Motor 2 rated current:1 (Motor 2 rated FLA)	0.32~6.40*2		F8-01	Transmission option (SI-F/G):1 (E-15 Det Sel)	-3	
E5-02	Motor 2 rated slip:1 (Motor 2 Slip Freq)	0.00~20.00		F9-01	External fault input level from transmission option (Ff0 Selection):	0, 1	
E5-03	Motor 2 no-load current:1 (Motor 2 No-load I)	*2		F9-02	External fault detection from transmission option (Ef0 Detection):1	0, 1	
E5-04	Motor 2 number of poles:1 (Motor 2 # poles)	2~48		F9-03	Action for external fault from transmission option (Ef0 Fault Act):1	0-3	
E5-05	Motor 2 line-to-line resistance (Motor 2 Term Ohms)	0.000~ 65.000		F9-04	Transmission option trace sampling time (Trace Sample Time):1	0~60000	
E5-06	Motor 2 leak inductance:1 (Motor 2 Leak)	0.0~40.0		F9-05	Torque reference/ torque limit selection fromnon-SI-K2 transmission cards (Torq Ref/Lmt Sel)	0~1	
F1-01	PG constant (PG Pulse/Rev)	0~60000		F9-06	Operation selection for non-SI-K2 tran smission error detection (BUS Fault Sel)	0~3	
F1-02	Operation selection at PG open circuit (PG Fdbk Loss Sel)	0~3		H1-01	Multi-function input (terminal 3) (Terminal 3 Sel)	0~77	
F1-03	Operation selection at overspeed (PG Overspeed Sel)	0~3		H1-02	Multi-function input (terminal 4) (Terminal 4 Sel)	0~77	
F1-04	Operation selection at deviation (PG Deviation Sel)	0~3		H1-03	Multi-function input (terminal 5) (Terminal 5 Sel)	0~77	
F1-05	PG rotation (PG Rotation Sel)	0, 1		H1-04	Multi-function input (terminal 6) (Terminal 6 Sel)	0~77	

* 1. Not displayed for some models depending on software version No.
* 2. Setting for 200 V class Inverters. For 400 V class Inverters, double the value.
* 3. Setting unit and initial setting depend on Inverter capacity.
* 4. Depends on the control method (A1-02).
* 5. Factory setting in the parentheses is for 3-wire sequence.

User Constants (Continued)

No.	Name (Display)	Factory Setting	Setting	No.	Name (Display)	Factory Setting	Setting
H1-05	Multi-function input (terminal 7) (Terminal 7 Sel)	0~77		L2-01	Momentary power loss detection (PwrL Selection)	0~2	
H1-06	Multi-function input (terminal 8) (Terminal 8 Sel)	0~77		L2-02	Momentary power loss ridethru time (PwrL Ridethru t)	0.0~2.0	
H2-01	Multi-function input (terminal 9-10) (Terminal 9 Sel)	0~37		L2-03	Min. baseblock time (PwrL Baseblock t)	0.1~5.0	
H2-02	Multi-function input (terminal 25-27) (Terminal 25 Sel)	0~37		L2-04	Voltage recovery time (PwrL V/F Ramp t)	0.1~5.0	
H2-03	Multi-function input (terminal 26-27) (Terminal 26 Sel)	0~37		L2-05	Undervoltage detection level (PUV Det Level)	150~210*2	
H3-01	Signal level selection (terminal 13) (Term 13 Signal)	0, 1		L2-06	KEB deceleration rate (KEB Frequency	0.0~100.0	
H3-02	Gain (terminal 13) (Terminal 13 Gain)	0.0~1000.0		L3-01	Stall prevention selection during accel (StallP Accel Sel)	0~2	
H3-03	Bias (terminal 13) (Terminal 13 Bias)	-100.00~ +100.0		L3-02	Stall prevention selection during accel (StallP Accel Sel)	0~200	
H3-04	Signal level selection (terminal 16) (Term 16 Signal)	0, 1		L3-03	Stall prevention limit during accel (StallP CHP Lvl)	0~100	
H3-05	Multi-function analog input (terminal 16) (Terminal 16 Sel)	0~1F		L3-04	Stall prevention selection during decel (StallP Decel Sel)	0~3	
H3-06	Gain (terminal 16) (Terminal 16 Gain)	0.0~1000.0		L3-05	Stall prevention selection during running (StallP Run Sel)	0~2	
H3-07	Bias (terminal 16) (Terminal 16 Bias)	-100.0~ +100.0		L3-06	Stall prevention level during running (StallP Run Level)	30~200	
H3-08	Signal level selection (terminal 14) (Term 14 Signal)	0~2		L4-01	Speed agree detection level (Spd Agree Level)	0.0~400.0	
H3-09	Multi-function analog input (terminal 14) (Terminal 14 Sel)	0~1F		L4-02	Speed agree detection width (Spd Agree Width)	0.0~20.0	
H3-10	Gain (terminal 14) (Terminal 14 Gain)	0.0~1000.0		L4-03	Speed agree detection level (+/-) (Spd Agree Lvl + -)	-400.0~+400.0	
H3-11	Bias (terminal 14) (Terminal 14 Bias)	-100.0~ +100.0		L4-04	Speed agree detection width (+/-) (Spd Agree Wdth + -)	0.0~20.0	
H3-12	Analog input filter time constant (Filter Avg Time)	0.00~2.00		L4-05	Operation when frequency reference is missing(Ref Loss Sel)	0, 1	
H4-01	Monitor selection (terminal 21) (Terminal 21 Sel)	1~38		L5-01	Number of auto restart attempts (Num of Restarts)	0~10	
H4-02	Gain (terminal 21) (Terminal 21 Gain)	0.00~2.50		L5-02	Auto restart operation selection (Restart Sel)	0, 1	
H4-03	Bias (terminal 21) (Terminal 21 Bias)	-10.0~ +10.0		L6-01	Torque detection selection 1 (Torq Det 1 Sel)	0~4	
H4-04	Monitor selection (terminal 23) (Terminal 23 Sel)	1~38		L6-02	Torque detection level 1 (Torq Det 1 Lvl)	0~300	
H4-05	Gain (terminal 23) (Terminal 23 Gain)	0.00~2.50		L6-03	Torque detection time 1 (Torq Det 1 Time)	0.0~10.0	
H4-06	Bias (terminal 23) (Terminal 23 Bias)	-10.0~ +10.0		L6-04	Torque detection selection 2 (Torq Det 2 Lvl)	0~4	
H4-07	Analog output signal level selection (AO Level Select)	0, 1		L6-05	Torque detection level 2 (Torq Det 2 Lvl)	0~300	
H5-01	Station address (Serial Comm Adr)	0~20		L6-06	Torque detection time 2 (Torq Det 2 time)	0.0~10.0	
H5-02	Communication speed selection (Serial Baud Rate)	0~4		L7-01	Forward torque limit (Torq Limit Fwd)	0~300	
H5-03	Communication parity selection (Serial Com Sel)	0, 1, 2		L7-02	Reverse torque limit (Torq Limit Rev)	0~300	
H5-04	Stopping method after communication error (Serial Fault Sel)	0~3		L7-03	Forward regenerative torque limit (Torq Lmt Fwd Rgn)	0~300	
H5-05	Communication error detection selection;1 (Serial Flt Dtct)	0, 1		L7-04	Reverse regenerative torque limit (Torq Lmt Rev Rgn)	0~300	
L1-01	Motor protection selection (MOL Fault Select)	0, 1		L8-01	Protect selection for internal DB resistor (DB Resistor Prot)	0, 1	
L1-02	Motor protection time constant (MOL Time Const)	0.1~5.0		L8-02	Overheat pre-alarm level (OH Pre-Alarm Lvl)	50~110	

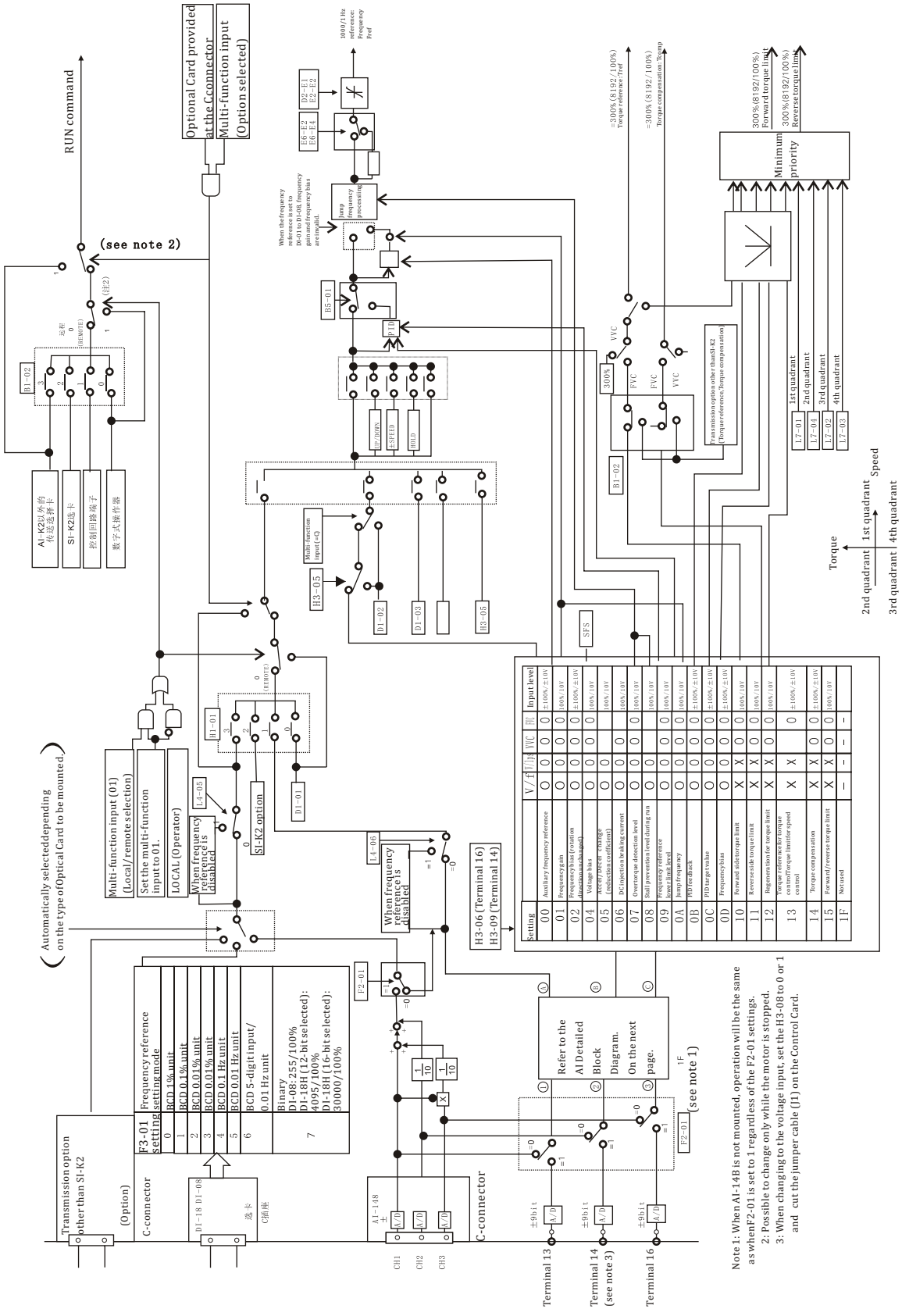
* 1. Not displayed for some models depending on software version No.
* 2. Setting unit and initial setting depend on Inverter capacity.
* 3. Setting for 200 V class Inverters. For 400 V class Inverters, double the value.
* 4. Not initialized. (Japanese standard specification is o2-09 = 0.)

User Constants (Continued)

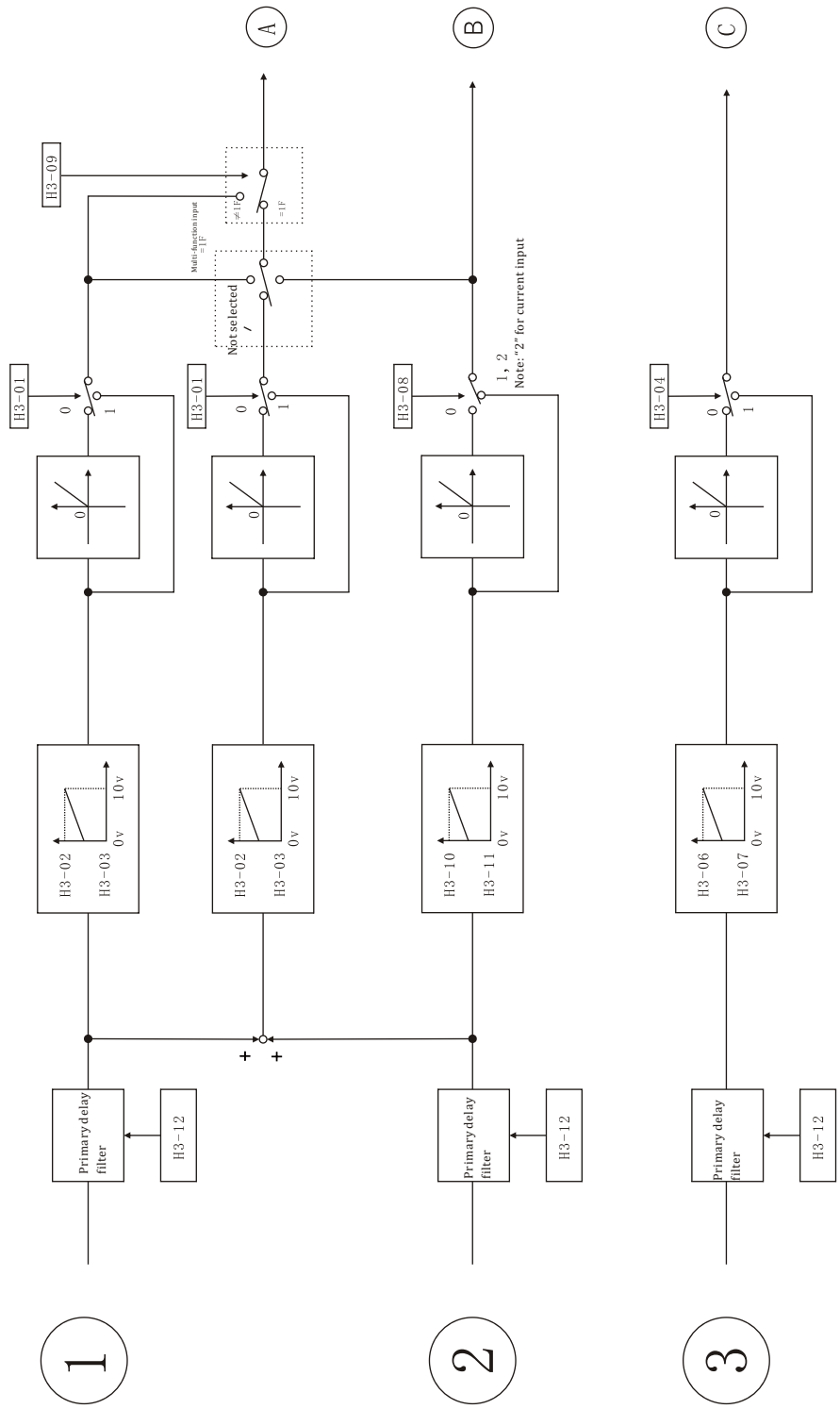
No.	Name (Display)	Factory Setting	Setting	No.	Name (Display)	Factory Setting	Setting
L8-03	Operation selection after overheat pre-alarm (OH Pre-Alarm Sel)	0~3		o1-05	Constant no. display selection (Address Display)	0, 1	
L8-05	Input open-phase protection selection (Ph Loss In Sel)	0, 1		o2-01	LOCAL/REMOTE key enable/disable (Local/Remote Key)	0, 1	
L8-07	Output open-phase protection selection (Ph Loss Out Sel)	0, 1		o2-02	STOP key during control circuit terminal operation (Oper STOP Key)	0, 1	
L8-10	Ground protection selection(Gnd Det Sel)	0, 1		o2-03	User constant initial value (User Defaults)	0~2	
L8-17	Carrier frequency reduction selection (L-Spd IGBT Prtct)	0~3		o2-04	kVA selection (Inverter Model #)	0~FF*	
L8-19	OL2 characteristics selection for low speeds (OL2 Chara@ L-Spd)	0, 1		o2-05	Frequency reference setting method:1 (Operator M.O.P.) *	0, 1	
o1-01	Monitor selection(Monitor Select)	4~38		o2-06	Operation selection when digital operator is disconnected (Oper Detection)	0, 1	
o1-02	Monitor selection after power up (Power-On Monitor)	1~4		o2-07	Cumulative operation time setting (Elapsed Time Set)	0~65535	
o1-03	Frequency units of reference setting/monitor (Display Scaling)	0~39999		o2-08	Cumulative operation time selection (Elapsed Time Run)	0, 1	
o1-04	Frequency units of constant setting (Display Units)	0, 1		o2-09	Initialize mode selection:1 (Init Mode Sel) *	0~2	

* 1. Not displayed for some models depending on software version No.
* 2. Setting unit and initial setting depend on Inverter capacity.

9.6 Function Block Diagram



A1 Detailed Block Diagram



9.7 Mounting Dimensions

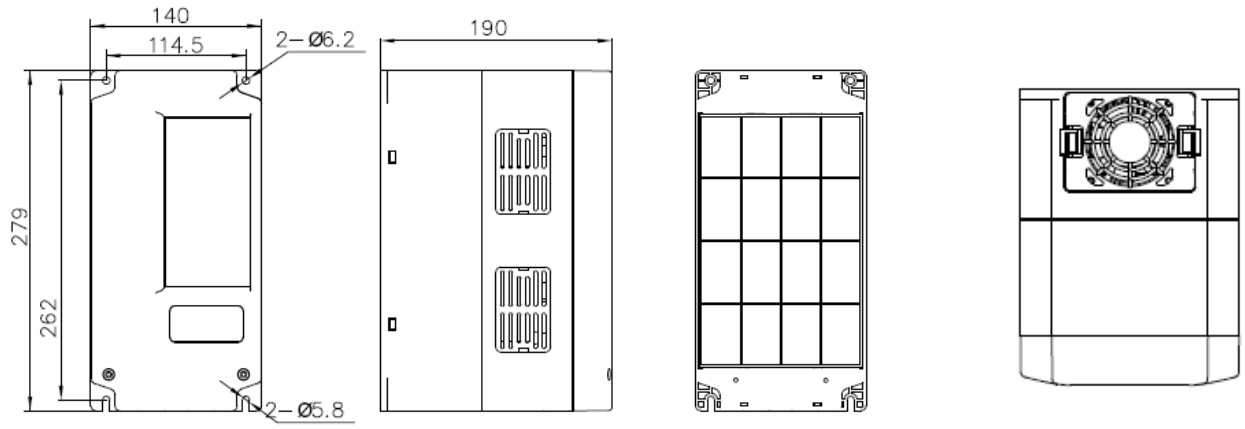


Fig.1

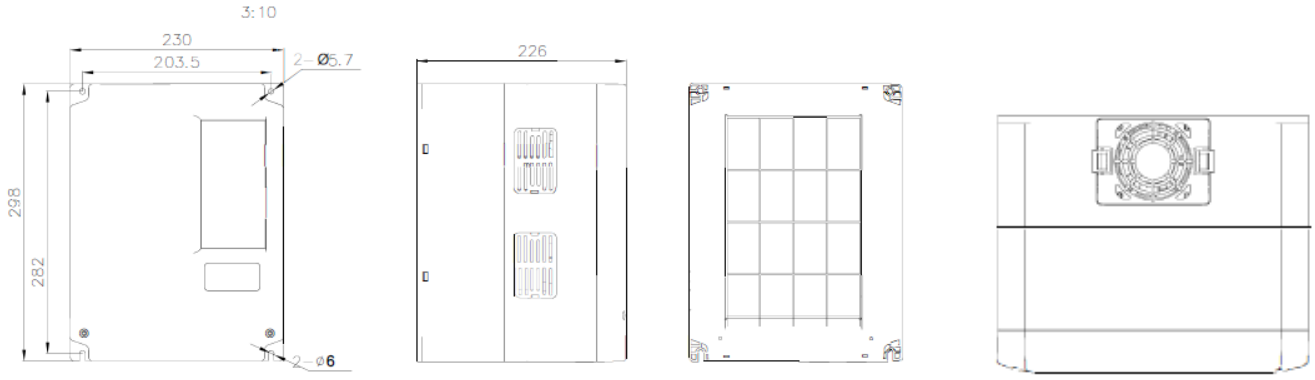


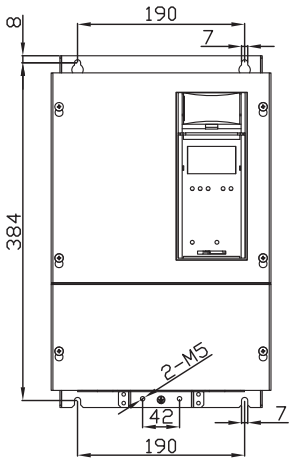
Fig.2

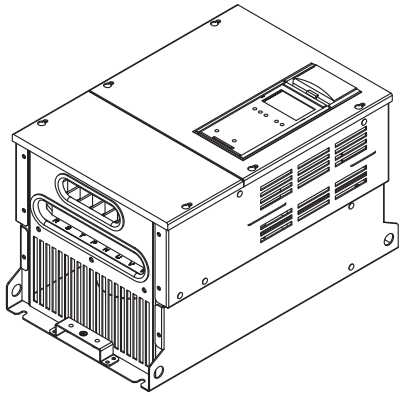
Model	Power	Dimensions			Installation dimensions		Fig
		H	W	D	H1	W1	
YD31P5T4BN~YD35P5T4BN	1.5-5.5kW	279	140	190	262	114.5	Fig.1
YD37P5T4BN~YD3022T4BN	7.5-22kW	298	229.5	226	282	203.5	Fig.2

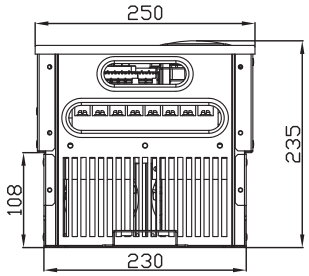
Unit: mm

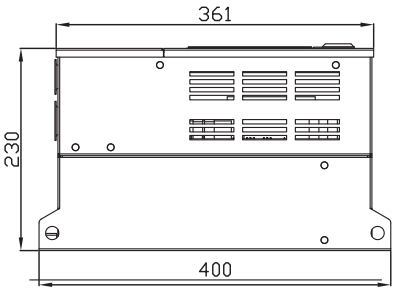
YD31P5 T4 BN
YD32P2 T4 BN
YD33P7 T4 BN
YD35P5 T4 BN
YD37P5 T4 BN
YD3011 T4 BN
YD3015 T4 BN
YD3018P5 T4 BN
YD3022 T4 BN

Installation size if there are changes Without prior notice Please consult the local agents

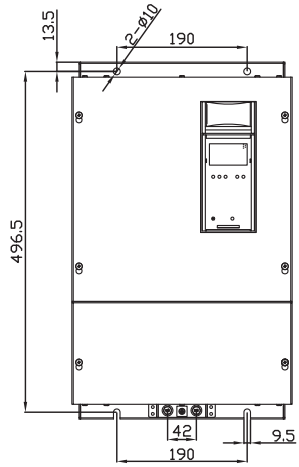


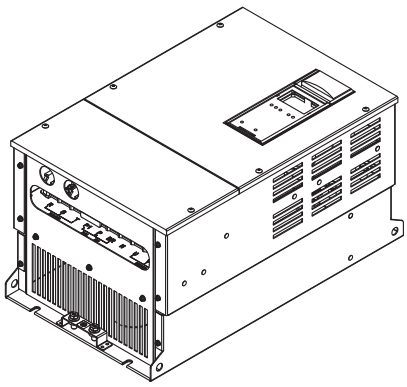


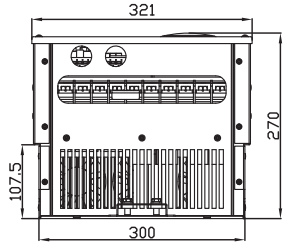


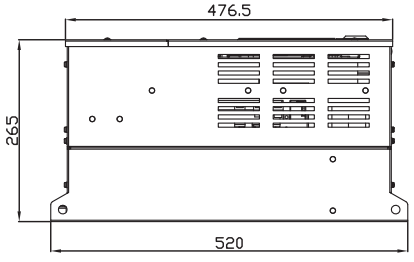


Frame 4:
YD3018 T4 BN
YD3022 T4 BN
YD3030 T4 N









Frame 5:
YD3030 T4 BN
YD3037 T4 (B)N
YD3045 T4 (B)N
YD3055 T4 (B)N

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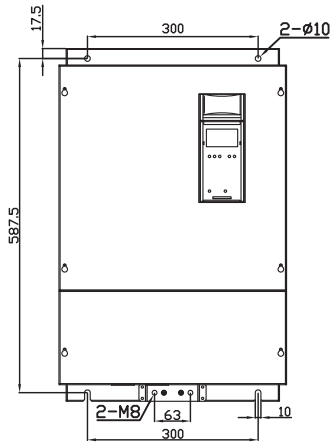
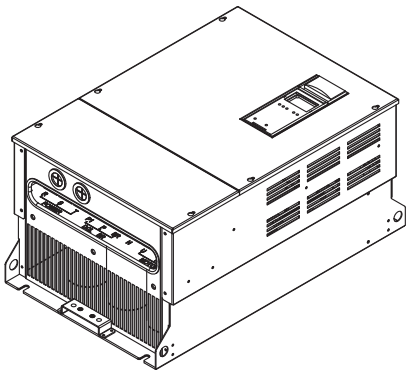
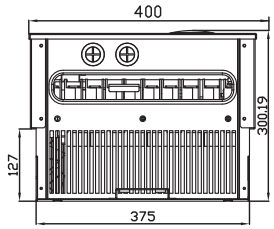
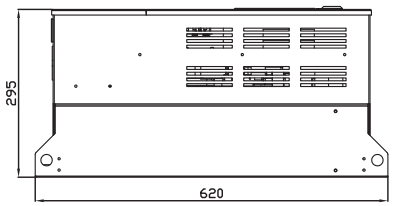
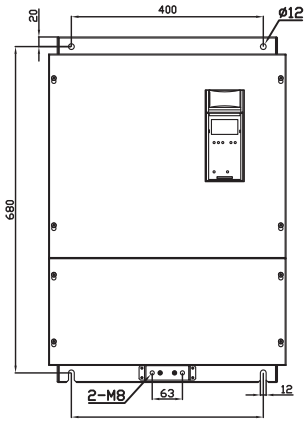


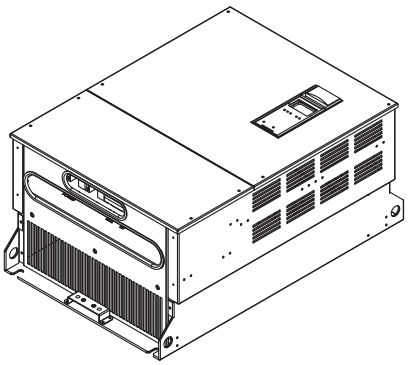


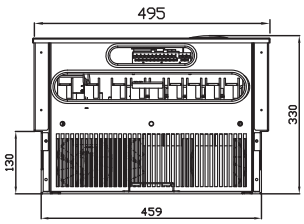


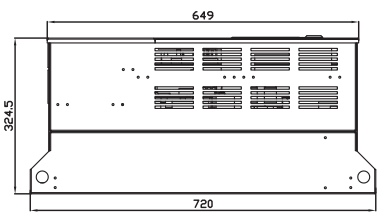


Frame 6:
YD3075 T4 (B)N
YD3093 T4 (B)N
YD3110 T4 (B)N









Frame 7:
YD3132 T4 (B)N
YD3160 T4 (B)N

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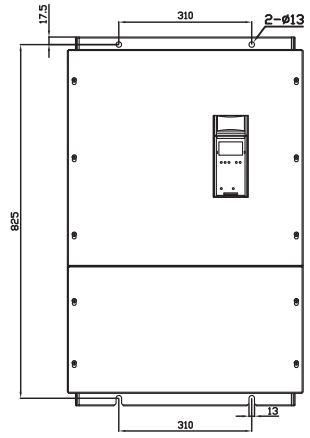
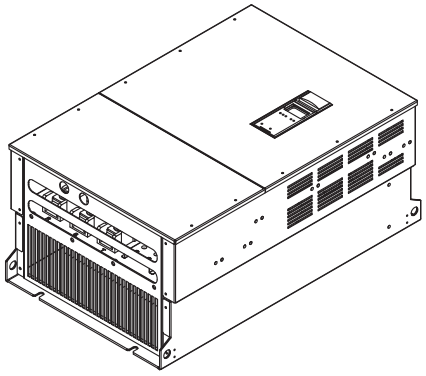
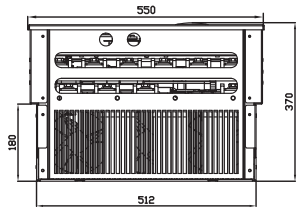
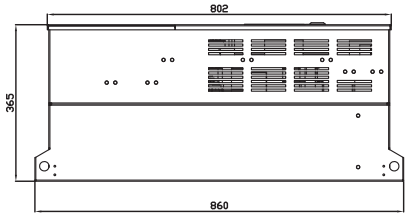
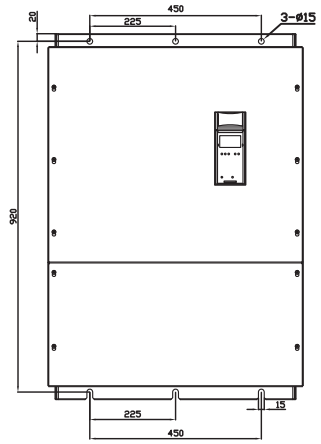


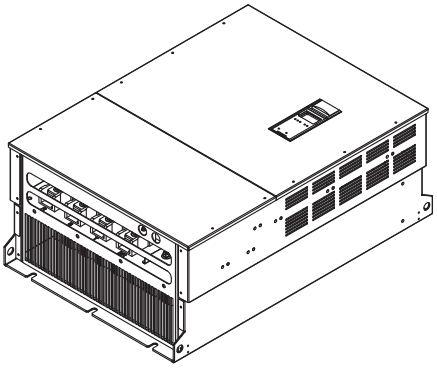


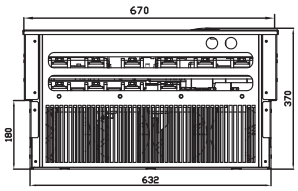


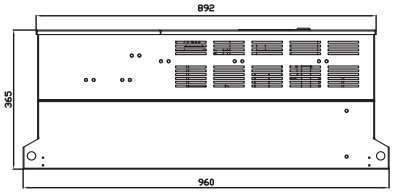


Frame 8:
YD3185 T4 (B)N
YD3200 T4 (B)N
YD3220 T4 (B)N
YD3250 T4 (B)N









Frame 9:
YD3280 T4 (B)N
YD3315 T4 (B)N

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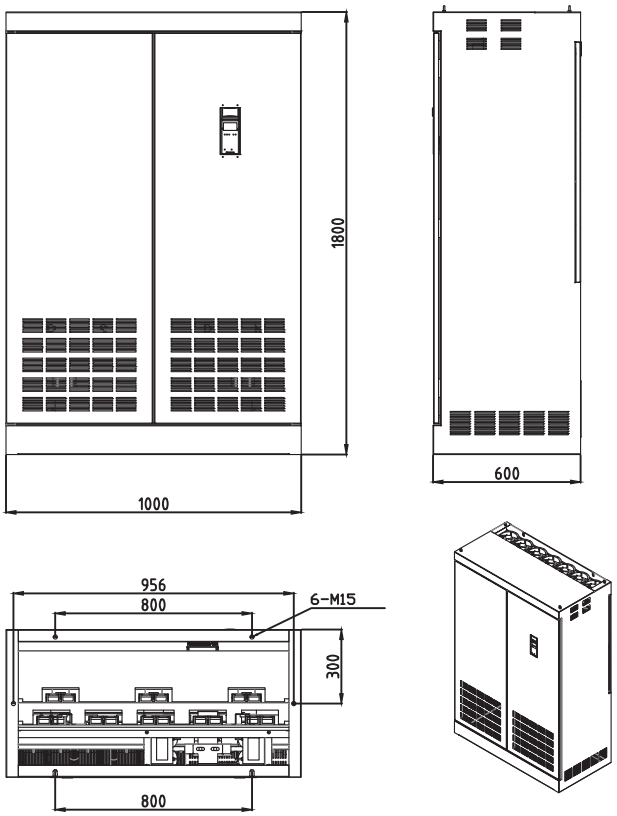
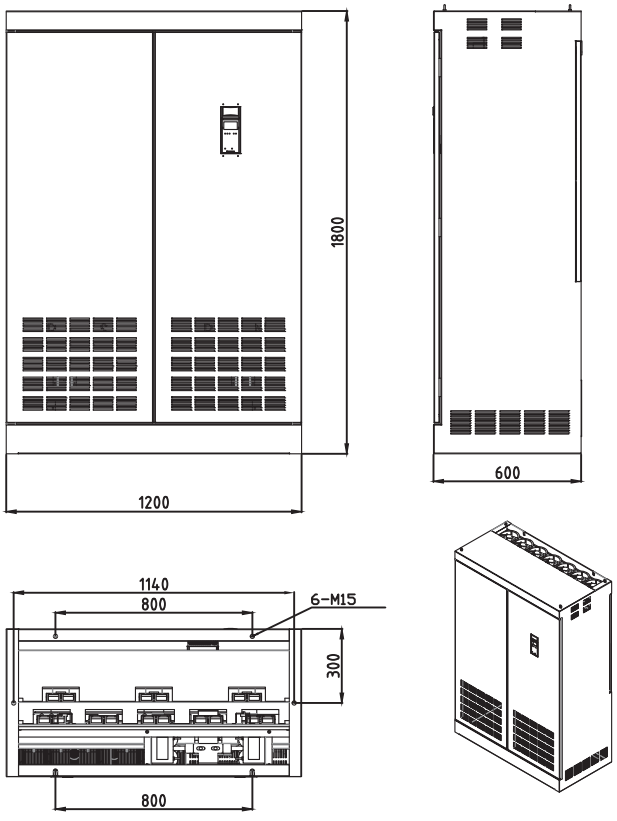


Frame 10

YD3355 T4 N
YD3400 T4 N
YD3450 T4 N



Frame 11

YD3500 T4 N
YD3560 T4 N
YD3630 T4 N

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