BONENG

MH/MP马达变频驱动一体机使用手册

MH/MP Motor Frequency Conversion Drive In One Machine Use Manual

08/2024

目录

1 安全注意

警告

只有合格的专业人员才能进行安装、操作、维护检查。
接触带电部分可能会造成人员伤害。若要检查设备，请先将电源关闭，在外部LED灯熄灭之前，驱动器内部仍有高压，请勿触碰内部端子及内部电路。
安装在合适的环境，否则可能通风空间不足等问题，导致设备过热，产生烟雾，引发火灾，从而造成人身伤害。
各个端子上加的电压只能按照说明书规定的电压，否则会造成故障或损坏。
正确接线，否则会造成驱动器损害或人身伤害。

2 安装与接线

2.1 产品信息

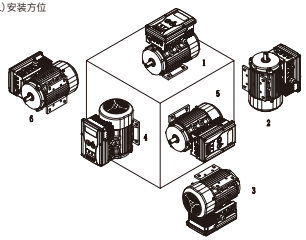
2.1.1 产品型号

MH100M4B22 H L 2 - D 0 MB 0 -1 1 1

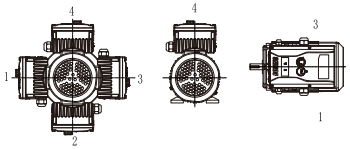
- **进线孔位置** [2]
  1/3
- **接线盒位置** [2]
  1/2/3/4
- **安装方位** [1]
  1/2/3/4/5/6
- **一体机防护等级**
  0=IP55　1=IP55+防雨罩
- **通讯协议**
  MB=Modbus RTU
  EC=EtherCAT
- **调速旋钮** [3]
  0=无调速旋钮　1=有调速旋钮
- **驱动器**
  D=分布式
- **频率/电压代号**
  2=47~63Hz/380~480V
- **机座材质**
  L=铝机座
- **安装形式**
  H=B3底脚安装
  F=B5法兰安装
  S=B14B法兰安装

功率(kW)	MH=IE2三相交流异步马达4极规格 MP=IE3三相交流异步马达4极规格
0.25	MH071M4A25… MP071M4A25…
0.37	MH071M4A37… MP071M4A37…
0.55	MH080M4A55… MP080M4A55…
0.75	MH080M4A75… MP080M4A75…
1.1	MH090S4B11… MP090S4B11…
1.5	MH090S4B15… MP090M4B15…
2.2	MH100M4B22… MP100M4B22…
3	MH100M4B30… MP100M4B30…

注1) 安装方位

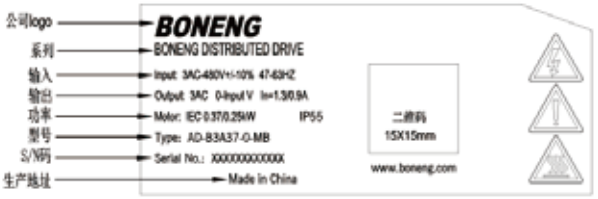


注2) 接线和进线位置(视角：安装方位1马达尾部)



注3) 选配的旋钮的机型，需注意安装方位，接线盒位置的的组合。建议整机安装后，旋钮朝上方或者侧方，并预留10mm旋钮空间。

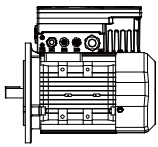
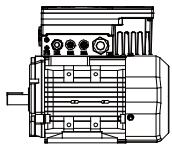
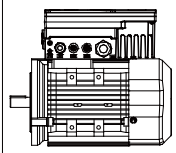
2.1.2 产品型号



2.2 运行(安装)环境

环境温度	-20℃~40℃
相对湿度	-20℃≤T≤20℃：100% 20℃ < T≤30℃：95% 30℃ < T≤40℃：55%
海拔高度	高度不超过海拔 1000m
马达防护等级	：防护等级为 IP55
马达绝缘等级	：绝缘系统按 155℃（F）温度等级设计，按 130℃（B）温度等级考核；
马达冷却方式	马达标准冷却方式为 IC411 自扇冷却

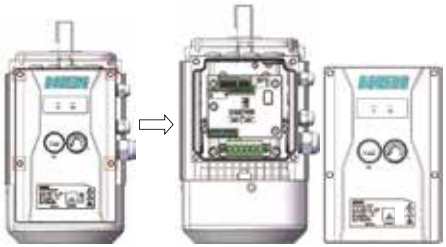
2.3 安装方式

基本结构型式	机座端盖有法兰，机座无底脚	机座有底脚，端盖无法兰	机座端盖有小法兰，机座无底脚
机座号	80～100	80～100	80～100
代号	B5	B3	B14B
示意图			

接线方式，以右端出线举例。

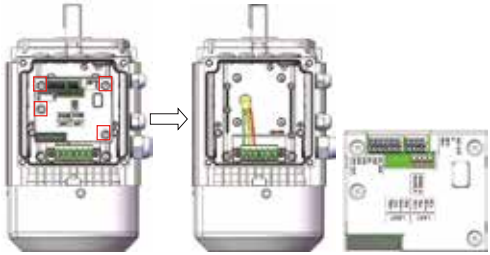
2.3.1 MB版本接线方式

2.3.1.1 拧松上盖上4颗不脱出螺丝，将功率模块从整机上移除(注2)。

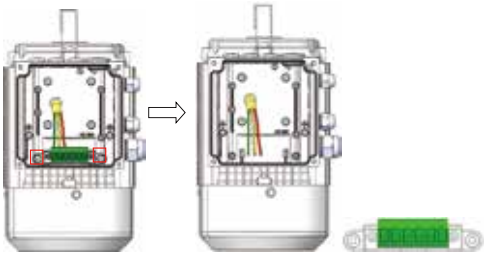


注3:拆卸时,请抓住功率模块两端,保持水平向上提起。

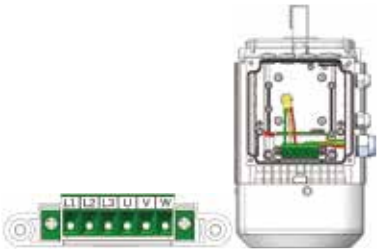
2.3.1.2拧松控制模块上4颗不脱出螺丝,将控制模块移除。



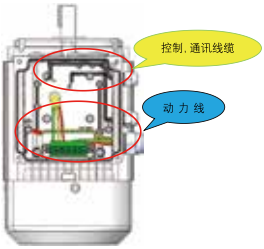
2.3.1.3拧松功率端子上2颗不脱出螺丝,移除电机动力电缆以及功率端子。



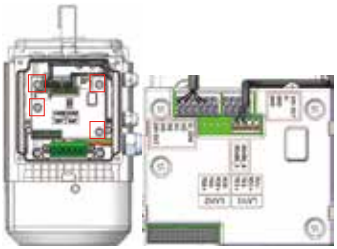
2.3.1.4将根据端子上的文字指示将外部动力线缆接入功率端子,接好电机线。固定功率端子,螺钉紧固扭力2.5Nm。



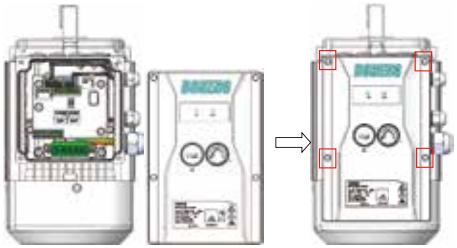
2.3.1.5 根据需求将DI,AI线缆（X1入口），MB通讯线（LAN1入口）由下图所示葛兰头接入。控制线揽走线勿与动力线缆交叉。



2.3.1.6 安装控制模块，螺钉紧固扭力2.5Nm。并根据塑壳上文字指示接好对应线缆。

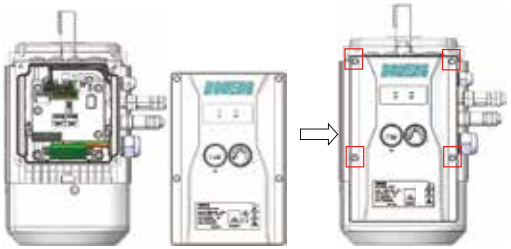


2.3.1.7安装功率模块，螺钉紧固扭力3.5Nm，整机装配结束。



2.3.2 EC版本接线方式

EC版本与MB版本区别在于通讯线接线方式不同。EC通讯为航插版本，出厂时，内部线缆
已经接好，只需照线标将通讯线插到合适位置，外部通讯电缆接入航插电缆连接器（注4）。



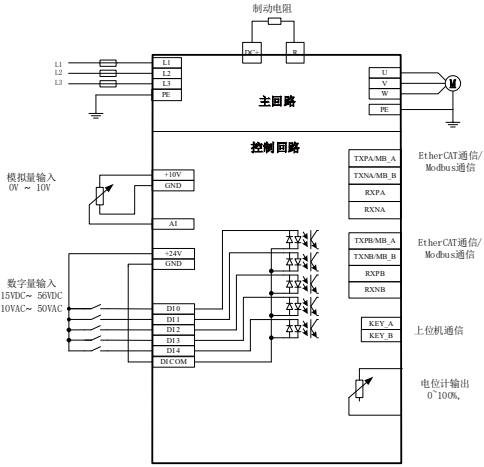
注4：航插电缆连接器与四芯网线线序对应如下表所示：

1	2	3	4
绿	绿白	橙	橙白

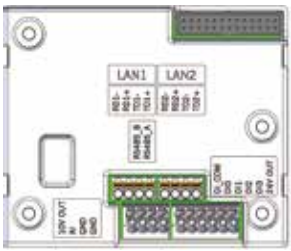
为适配航插，葛兰头以及腔温对线缆有以下要求

分类	耐温℃	外径mm	屏蔽
动力线缆	> 90	10-17	
AI,DI线缆	> 90	6-8	
MB通讯线缆	> 90	6-8	
EC通讯线缆	> 90	6-8	√

2.3.3 端子接线图



控制端子排列图如下：

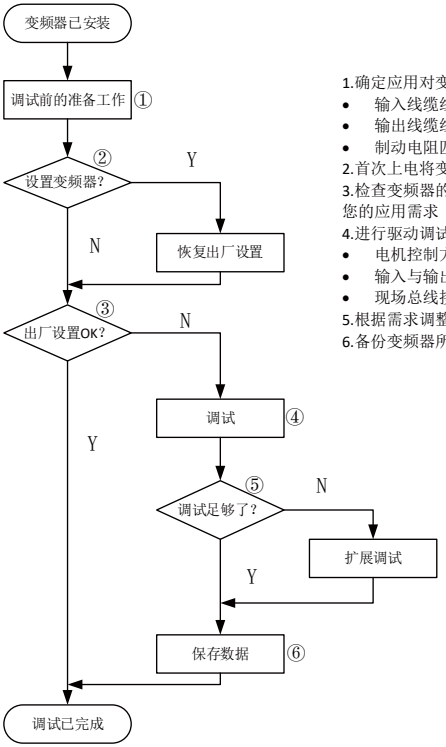


功能	端子	说明与概述	技术数据
上位机通信	KEY_A	RS_485通信	支持上位机通信
	KEY_B		
Modbus通信	MB_A	RS_485通信	支持Modbus-RTU
	MB_B		光耦隔离
EtherCAT通信	TXPA/TXPB	以太网通信	支持EtherCAT通信
	TXNA/TXNB		
	RXPA/RXPB		
	RXNA/RXNB		
输出电源	+10V	数字输出端子+10V电压	+11.7VDC±5%，最大20mA
	+24V	数字输出端子+24V电压	+24V±10%，最大200mA
数字量输入	DI0	四个数字量输入DI	隔离电压2.5KV，兼容双极性输入
	DI1		小于5V为低，大于11V为高
	DI2		支持VAC 48V输入
	DI3		
	DI_COM		
模拟量输入	AI	一个模拟量输入AI	单端输入
			支持电压型0~10V输入
			误差±1%

注:控制端子外接设备时,必须注意端子的电压,,电流规格,以免损坏变频器。
注2:控制信号接线要求:
模拟信号:必须使用屏蔽电缆,推荐使用双绞双屏蔽电缆。每个模拟信号占用一个绞线对,所有屏蔽层拧成一束并接到PE上。
数字信号:选择带屏蔽电缆,也可采用无屏蔽双绞线;模拟信号和数字信号使用不同的电缆分开走线。

3 调试与操作

3.1调试指南



1.确定应用对变频器的需求
- 输入线缆线径
- 输出线缆线径
- 制动电阻匹配阻值

2.首次上电将变频器恢复为出厂值
3.检查变频器的出厂设置是否已满足您的应用需求
4.进行驱动调试时设置以下项目：
- 电机控制方式
- 输入与输出
- 现场总线接口

5.根据需求调整变频器参数
6.备份变频器所有参数

在确认变频器无误后再连接电机调试，如果电机电源相序U1，V1，W1依次与接线柱U1，V1，W1连接，从电机的驱动端观察转轴，其旋转方向为顺时针。电动机起动后，注意观察电机、传动装置、生产机械及变频器面板的显示数据，若有异常现象应立即停机，查明故障并排除之后，方可重新启动。
换接电源线中的任意两相就可以改变电机的旋转方向。

3.2 调试前的准备工作

3.2.1收集电机数据

在开始调试前，需要确定以下信息：
◆驱动器上连接的是哪一种电机?
请记录下电机的产品编号以及铭牌上的数据，并将相关电机参数记录到驱动器对应的参数列表中。
◆如何连接电机?
注意电机的接线（星形接线 [Y] 或三角形接线 [Δ]）。记下与接线相对应的电机数据。

3.2.2驱动器的出厂设置

驱动器机型设置
出厂时，驱动器已经根据功率模块的额定功率进行了匹配设置。
驱动器控制
驱动器控制的出厂设置信号来源于端子，端子的出厂设置取决于控制模块的设置。

X6:1	DI0	正转运行
X6:2	DI1	反转运行
X6:3	DI2	...（无功能）
X6:4	DI3	...

X3:1	AI0+	...
X3:2	AI0-	

开通和关断电机

在驱动器的出厂设置中，以 5Hz 的频率设定值（电机额定频率为50Hz）为例，驱动器会使电机在接通后的5秒内加速到该设定值。同样，在关闭电机后，驱动器也会使电机在5秒内减速制动。

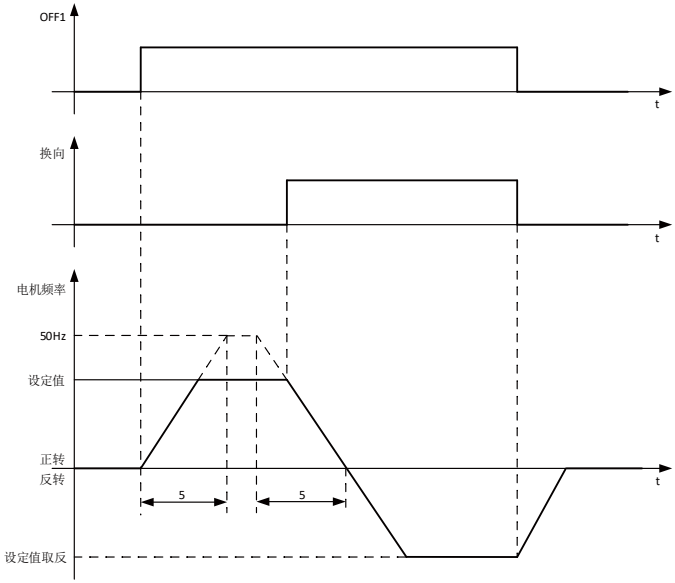


图5-1 出厂设置中电机的开通、关断和换向

3.3恢复出厂值

有些情况会导致调试出现异常，例如：

◆调试期间电源中断，使调试无法结束。

◆调试过程中因不懂某个参数的含义而无法继续设置。

◆您不清楚驱动器是否已经使用过一次。

在这些情况下请将驱动器恢复到出厂设置。

表5-X 参数恢复出厂值

参数	参数名称	描述
A04.00	参数复位模式	0:无效 1: 机型参数，马达参数，故障记录不复位。 2: 马达参数，故障记录不复位。 3: 全部参数复位。 4: 清除故障记录（E01组~E06组）
A04.01	参数复位	0:取消 1:确认

机型参数：驱动器设置PM驱动模块的功率机型参数。

电机参数：驱动器驱动的电机参数。

示例：

目标需求：机型参数和电机参数以外的参数进行恢复出厂值操作。

步骤：

1.A04.00=1；

2.A04.01=1；

等待5S后，驱动器完成恢复出厂值操作。

3.4 操作面板操作与显示

操作与显示界面介绍

用操作面板，可对驱动器进行功能参数修改、驱动器工作状态监控和驱动器运行控制（起动、停止）等操作，其外型及功能区如下图所示：

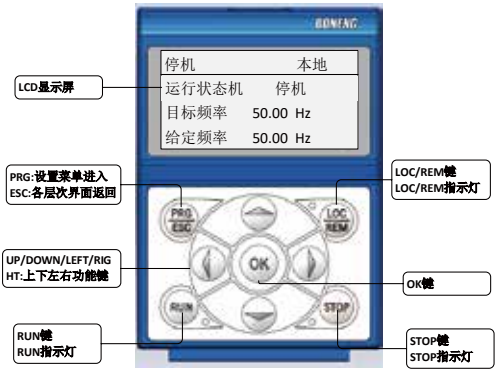


图 3-1 操作面板示意图

1)功能指示灯说明

LOC/REM指示灯：灯亮表示面板操作控制状态，灯灭表示处于远程操作控制状态。

STOP指示灯：灯亮时表示驱动器处于停机状态。

RUN指示灯：灯亮时表示驱动器处理运行状态。

2)操作面板按键说明

表 3-1 操作面板按键功能表

按键	名称	功能
PRG/ESC	编程键/返回键	主监控界面时，按此键进入功能选择界面；其他界面，按此键返回上一级界面或状态
LOC/REM	本地/远程键	获取或放弃键盘控制权
STOP	停止键	运行状态时，按此键可用于停止运行操作；停机状态时，按此键可复位故障状态
RUN	运行键	在键盘操作方式下，用于运行操作
◆	递增键	数据或功能码的递增
◆	递减键	数据或功能码的递减
▶	右移位键	在修改参数时，可以循环向右选择参数的修改位
◀	左移位键	在修改参数时，可以循环向左选择参数的修改位
OK	确认键	逐级进入菜单画面、设定参数确认

3)LCD显示界面说明

LCD显示界面采用4行中文的显示方式，其中首行为状态显示行。无故障时，显示当前运行状态(停机/运行)，点动控制，本地/远程状态等信息。当发生故障时，首行优先显示当前故障码，如下图所示：

停机	本地
运行状态机	停机
目标频率	50.00 Hz
给定频率	50.00 Hz

图 2 正常状态LCD显示示例

故障:变频器过温1	
运行状态机	停机
目标频率	50.00 Hz
给定频率	50.00 Hz

图 3 故障状态LCD显示示例

功能码查看、修改方法说明

AD 驱动器的操作面板采用多级菜单结构进行参数设置等操作，界面采用4行中文显示，非常直观且便于操作。

在参数设置界面状态下，通过上下按键可以依次循环查看该组功能码。按OK键，进入参数设置界面。

举例：将功能码B05.00从VF控制更改为SVC控制的示例，如下图所示。

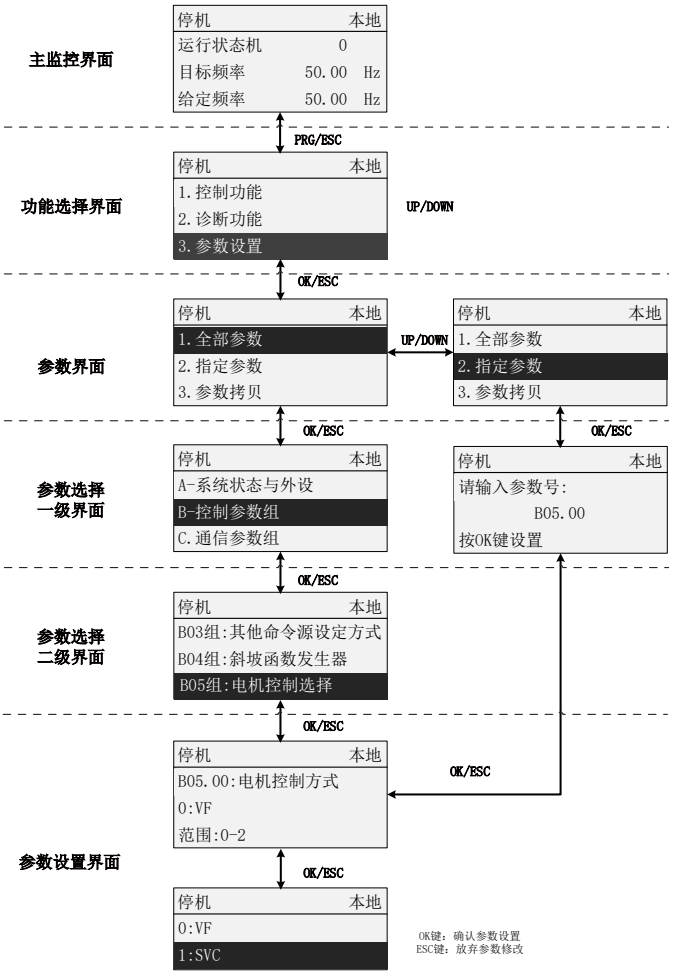
参数设置的结果为以下之一：

1)修改成功

2)只读参数

3)无权限修改

4)只能停机修改



主界面监控参数选择

主界面可监控参数数量为6个，可监控参数范围是A00.00~A00.16,共17个参数。主监控界面的监控参数，可通过设置A00.41~A00.46的参数值来选择。

举例：需要在主监控界面第2行显示A00.14(直流母线电压),只需修改A00.42的参数值为14即可。

4 扩展调试

4.1驱动器功能一览

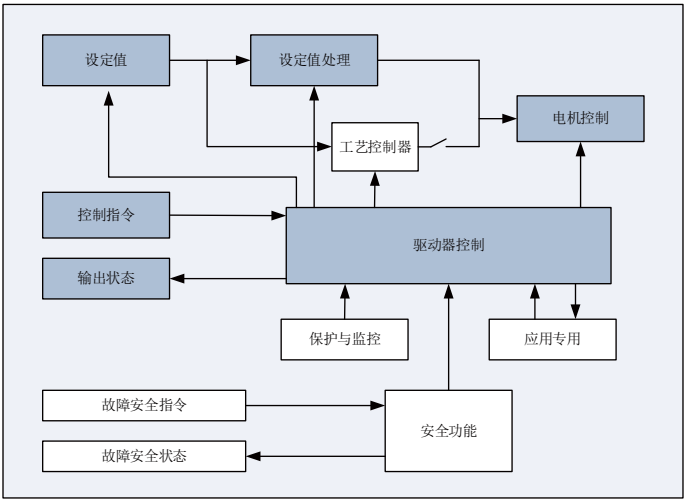


图4-1 驱动器功能一览

常用功能		特殊功能	
每一种应用下都需要使用的功能在上面的功能一览图中以深色显示。 请在基本调试期间对这些功能进行合适的设置，以便在很多应用中无需其他设置便可直接运行电机。		需要根据需求调整参数的功能在上面的功能一览图中以白色显示。	
驱动器控制	驱动器控制的权限大于所有其他功能，它定义了驱动器如何响应上级控制器指令	保护与监控	保护及监控功能可以避免损坏电机、驱动器和工作机械，如通过温度监控或转矩监控。
指令 输出状态	上级控制器的指令通过数字量输入或现场总线发送给驱动器。驱动器将它的状态信息反馈给控制模块输出端或现场总线。	应用专用	应用专用功能可控制例如电机抱闸，或通过工艺控制器使能上位压力控制或温度控制。
设定值	必须确定一个设定值，比如：转速设定值	安全功能	安全功能用于对驱动器功能的安全性有高要求的应用场合。 基本功能安全封锁驱动转矩。
设定值处理	设定值处理用于避免斜坡函数发生器使转速剧烈变化，并将转速制在最大值以下。		
电机控制	电机控制用于使电机跟踪转速设定值。您可以在矢量控制和 V/f 控制之间进行选择。		

4.2驱动器控制

4.2.1开通和关断电机

接通电源电压后，驱动器通常都会进入“开机准备”状态。在该状态下，驱动器会一直等待接通电机的指令：

◆收到 OFF1-ON

指令后，驱动器会接通电机。驱动器进入“运行”状态。

◆发出 OFF1-OFF

指令后，驱动器对电机进行制动。在电机停止后，驱动器将关闭输出。驱动器回到“开机准备”状态。

驱动器状态及开通和关断电机的指令

除 OFF1 指令外，停止电机的指令还有：

◆OFF2 -ON 驱动器立即停止输出，不先对电机进行制动。

◆OFF3 -ON 该指令的含义是“紧急停止”。发出 OFF3-ON指令后，驱动器以OFF3减速时间使电机制动。在电机停止后，驱动器将关闭输出。

该指令经常在非正常运行情况下使用，以使电机快速制动。典型应用为碰撞保护。

◆暂停运行 - 驱动器以OFF1/OFF2/OFF3的停机方式停止电机运行。

◆正常运行 - 驱动器驱动电机运行。

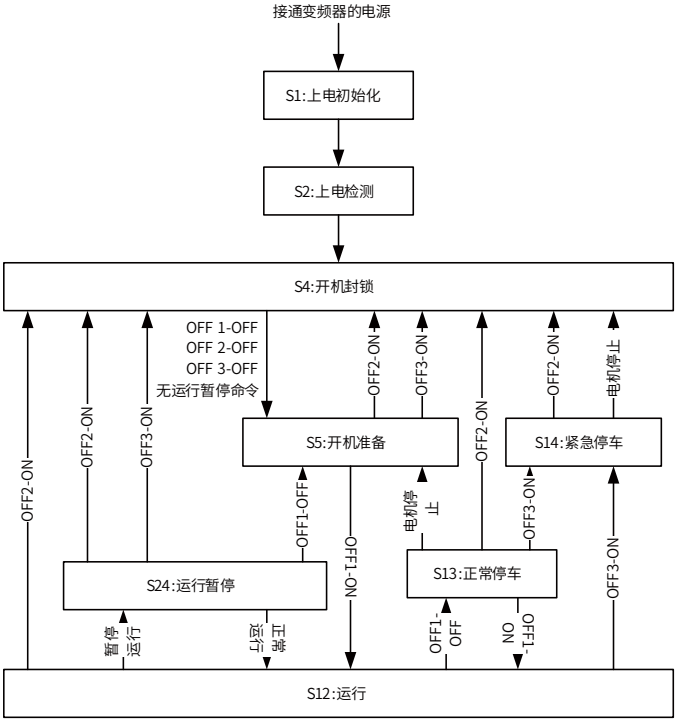


图4-2 电机开通和关断时驱动器的内部顺序控制

驱动器状态说明表：

驱动器状态	说明
S1	驱动器接通电源后的初始化状态
S2	驱动器初始化后对功率器件进行的检测状态
S4	驱动器没有满足电机运行条件时所处于的状态
S5	驱动器满足电机运行条件时的状态
S12	驱动器输出使电机运行
S13	电机已被 OFF1 指令关闭并在斜坡函数发生器的斜坡下降时间内制动
S14	电机已被 OFF3 指令关闭并以 OFF3减速时间或根据电流限值减速制动
S24	电机运行处于暂停状态

4.2.2调整端子排的预设置

本章节介绍如何修改驱动器各个数字量和模拟量输入功能。

数字量输入

修改数字量输入的功能

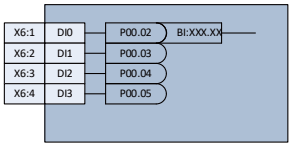


图4-3 数字量输入功能图

注:必须将 DI的状态参数与选中的二进制互联输入连接在一起,才可以修改 DI 的功能。

表4-1 部分常用驱动器二进制互联输入参数

BI	含义	BI	含义
B00.01	自定义OFF1来源	B03.12	多段给定值选择1
B00.02	自定义OFF2来源1	B03.13	多段给定值选择2
B00.13	故障复位来源	B03.14	多段给定值选择3
B01.01	启停控制命令方式	B04.00	RFG斜坡时间选择1
B01.03	启停命令输入IN1	B04.01	RFG斜坡时间选择2
B01.04	启停命令输入IN2	E00.00	外部故障1来源
B01.05	启停命令输入IN3	F03.00	PID功能有效信号
B03.09	电动电位器增加来源选择	F03.01	PID运算使能信号
B03.10	电动电位器减少来源选择		

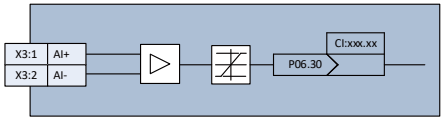
示例:修改数字量输入的功能

将外部故障来源选择(E00.00)和DI0相连,以通过数字量输入DI0来触发外部故障的产生。设置E00.00的互联参数为P00.02。

注:互联参数的代表编号的编码规则约定为参数编号+1000;即P00.02的编号为1002;P13.11的编号为2311;P15.89的编号为2589;其他互联参数类推。

模拟量输入

概述



更改模拟量输入的功能:

使用参数A07.04,确定模拟量的输入信号类型。

确定模拟量输入端的类型

A07.04	AI输入类型	1: 0~10V

特性曲线

根据模拟量输入的类型后，驱动器会自动调整模拟量输入的定标。线性的定标曲线由两个点确定。参数 A07.06~A07.09对应AI模拟量输入。

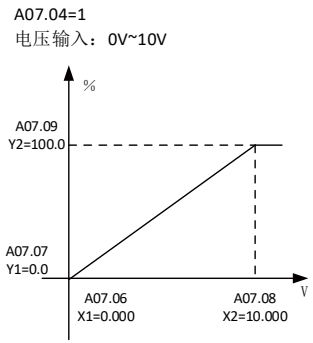


图4-4 定标特性曲线示例

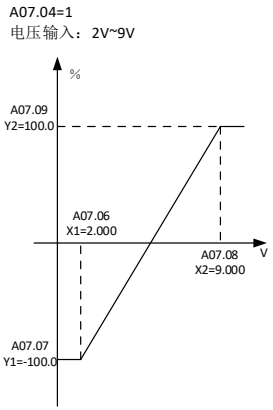
参数编号	参数名称	参数设定范围
A07.06	AI曲线最小输入值	00.000 ~ 10.000
A07.07	AI曲线最小输入比例	-600.0% ~ 600.0%
A07.08	AI曲线最大输入值	00.000 ~ 10.000
A07.09	AI曲线最大输入比例	-600.0% ~ 600.0%

调整特性曲线

预定义的类型和您的应用不符时，需要自定义定标曲线。

修改示例

驱动器应通过 AI将“2V … 9V”范围内的信号换算成“-100 % … 100 %”范围内的值。



设置以下参数，将模拟量输入设为带监控的电流输入：

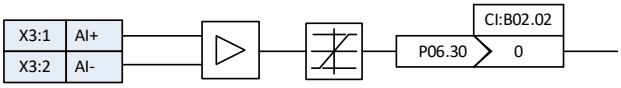
1.设置A07.06=2.000(X1)

2.设置A07.07=-100.0(Y1)

3.设置A07.08=9.000(X2)

4.设置A07.09=100.0(Y2)

确定模拟量输入的功能-示例



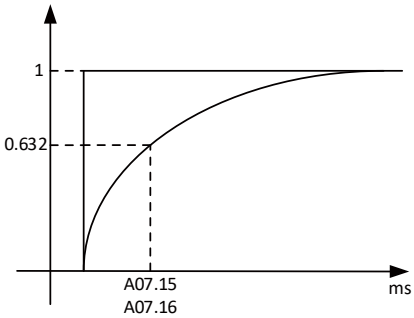
将AI和附加速度给定的信号源相连，以通过模拟量输入AI给定附加速度给定。

设置 B02.02的互联参数为P06.30。

高级设置

信号的平滑滤波

必要时您可以使用参数A07.15或A07.16对通过模拟量输入读出的信号进行平滑滤波。



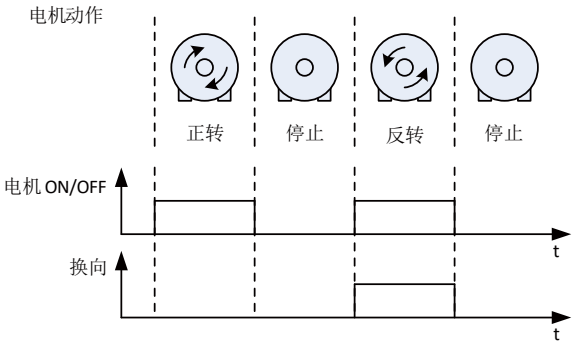
4.2.3通过数字量输入(DI)控制驱动器

有六种通过数字量输入控制电机的方法。

单线制控制

单线制控制,输入端子仅控制电机的启停,电机的旋转方向由当前的驱动器输出端接线相序决定。

双线制控制,方法1



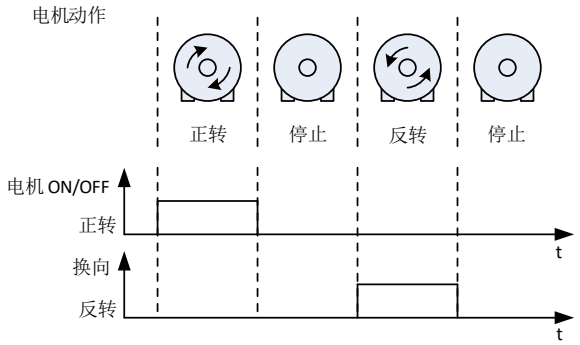
控制指令

1. 接通和关闭电机 (ON/OFF1)。
2. 切换电机旋转方向(反转)。

典型应用:

传送带应用的现场控制。

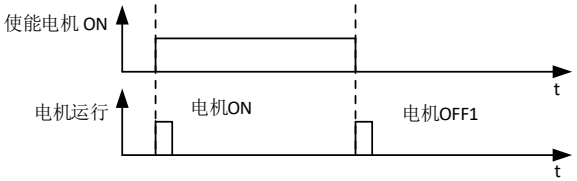
双线制控制，方法2



控制指令
1. 接通和关闭电机 (ON/OFF1)，正转。
2. 接通和关闭电机 (ON/OFF1)，反转。

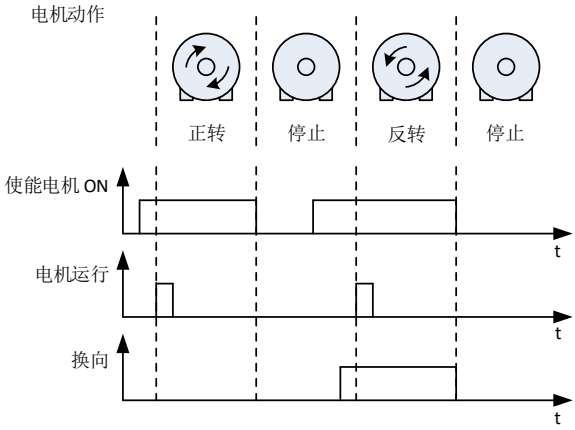
典型应用
通过主开关进行控制的运行传动。

双线制控制，方法3



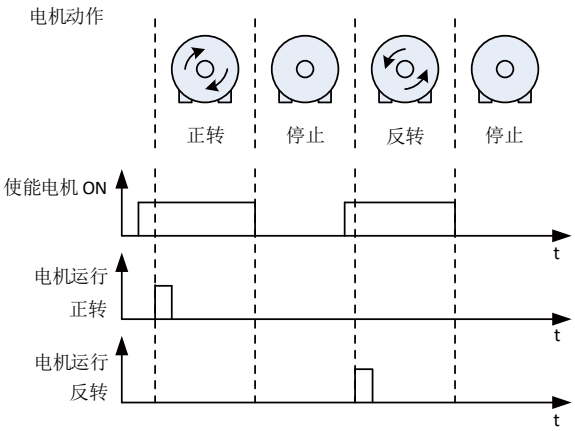
控制指令：
1. 使能电机和关闭电机 (OFF1)。
2. 接通电机 (ON)，电机的旋转方向由当前的驱动器输出端接线相序决定。

三线制控制，方法1



控制指令
1. 使能电机和关闭电机 (OFF1)。
2. 接通电机 (ON)。
3. 切换电机旋转方向（反转）。

三线制控制，方法2



控制指令
1. 使能电机和关闭电机 (OFF1)。
2. 电机运行正转指令 (ON)，正转。
3. 电机运行反转指令 (ON)，反转

典型应用：
通过主开关进行控制的运行传动。

4.2.4双线制控制，方法1

在这种控制方法中，您通过一个控制指令(ON/OFF1)控制电机的启停，通过另一个控制指令控制电机的正转、反转。

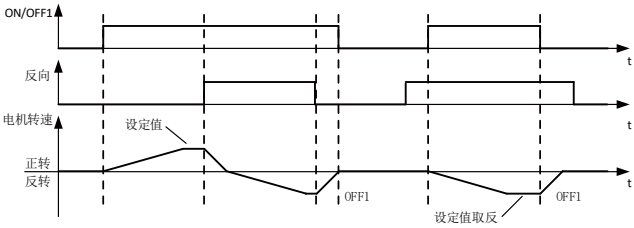


图4-5 双线制控制，方法1

表4-2端子功能表

ON/OFF1(IN1)	反向(IN2)	功能
0	0	OFF1：电机停止
0	1	OFF1：电机停止
1	0	ON：电机正转
1	1	ON：电机反转

相关参数设定

参数编号	参数名称	参数说明
B01.01	启停控制 命令方式	设置B01.01=2， 表示双线制控制：方法1。
B01.03	启停命令 输入IN1	输入端子来源选择， 此参数为二进制互联参数。
B01.04	启停命令 输入IN2	输入端子来源选择， 此参数为二进制互联参数。

4.2.5双线制控制，方法2

在这种控制方法中，第一个控制指令 (ON/OFF1)
用于接通和关闭电机，并同时选择电机的正转。
第二个控制指令同样用于接通和关闭电机，同时选择电机的反转。
仅在电机静止时驱动器才会接收新指令。

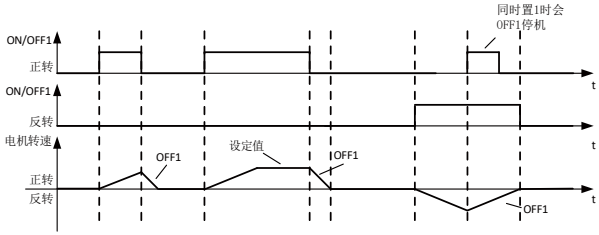


图4-6 双线制控制，方法2

表4-3端子功能表

ON/OFF1 正转(IN1)	ON/OFF1 反转(IN2)	功能
0	0	OFF1：电机停止
1	0	ON：电机正转
0	1	ON：电机反转
1	1	OFF1：电机停止

相关参数表

参数编号	参数名称	参数说明
B01.01	启停控制 命令方式	设置B01.01=3， 表示双线制控制：方法2。
B01.03	启停命令 输入IN1	输入端子来源选择， 此参数为二进制互联参数。
B01.04	启停命令 输入IN2	输入端子来源选择， 此参数为二进制互联参数。

4.2.6双线制控制，方法3

在这种控制方法中，第一个控制指令用于使能另外一个控制指令。
取消使能后，电机关闭(OFF1)。
第二个控制指令的上升沿将电机运行；电机的运行方向取决于驱动器输出端的接线相序。

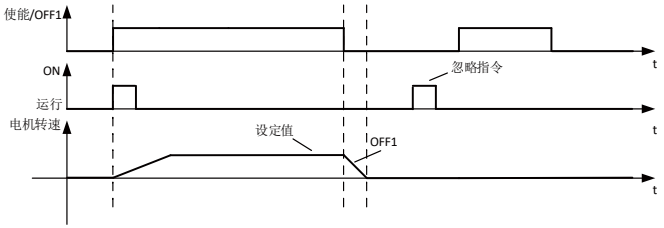


图4-7 双线制控制，方法3

表4-4端子功能表

使能/OFF1(IN2)	ON/OFF1(IN1)	功能
0	0	OFF1：电机停止
0	0->1	OFF1：电机停止
1	0	OFF1：电机停止
1	0->1	ON：电机旋转，方向以驱动器输出线接线相序为准

相关参数表

参数编号	参数名称	参数说明
B01.01	启停控制 命令方式	设置B01.01=4， 表示双线制控制：方法3。
B01.03	启停命令 输入IN1	输入端子来源选择， 此参数为二进制互联参数。
B01.04	启停命令 输入IN2	输入端子来源选择， 此参数为二进制互联参数。

4.2.7三线制控制，方法1

在这种控制方法中，第一个控制指令用于使能另外两个控制指令。
取消使能后，电机关闭 (OFF1)。
第二个控制指令的上升沿接通电机 (ON)。
第三个控制指令确定电机的旋转方向 (换向) 。

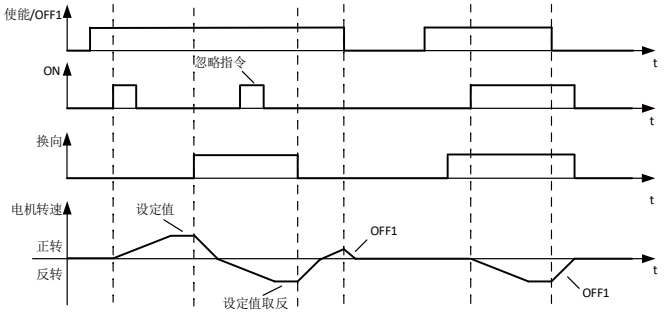


图4-8 三线制控制，方法1

表4-5端子功能表

使能/OFF1(IN2)	ON(IN1)	换向(IN3)	功能
0	0或1	0或1	OFF1：电机停止
1	0->1	0	ON：电机正转
1	0->1	1	ON：电机反转

相关参数表

参数编号	参数名称	参数说明
B01.01	启停控制 命令方式	设置B01.01=5， 表示三线制控制：方法1。
B01.03	启停命令 输入IN1	输入端子来源选择， 此参数为二进制互联参数。
B01.04	启停命令 输入IN2	输入端子来源选择， 此参数为二进制互联参数。
B01.05	启停命令 输入IN3	输入端子来源选择， 此参数为二进制互联参数。

4.2.8三线制控制，方法2

在这种控制方法中，第一个控制指令用于使能另外两个控制指令。
取消使能后，电机关闭 (OFF1)。
第二个控制指令的上升沿将电机切换至正转。若电机处于未接通状态，则会接通电机。
第三个控制指令的上升沿将电机切换至反转。若电机处于未接通状态，则会接通电机。

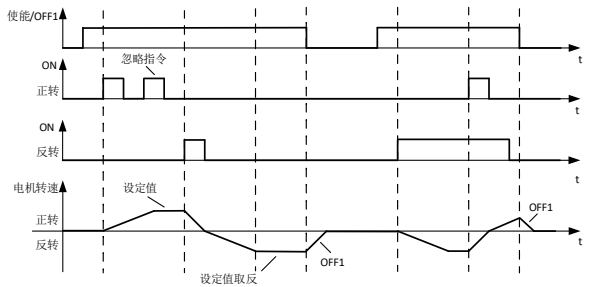


图4-9 三线制控制，方法2

表4-6端子功能表

使能/OFF1(IN3)	ON正转(IN1)	ON反转(IN2)	功能
0	0或1	0或1	OFF1：电机停止
1	0->1	0	ON：电机正转
1	0	0->1	ON：电机反转
1	1	1	电机不动作

相关参数表

参数编号	参数名称	参数说明
B01.01	启停控制 命令方式	设置B01.01=6， 表示三线制控制，方法2。
B01.03	启停命令 输入IN1	输入端子来源选择， 此参数为二进制互联参数。
B01.04	启停命令 输入IN2	输入端子来源选择， 此参数为二进制互联参数。
B01.05	启停命令 输入IN3	输入端子来源选择， 此参数为二进制互联参数。

4.2.9电机点动(JOG功能)

“JOG” 功能通常是用于缓慢移动一个机械部件，比如，移动传送带。
通过“JOG”功能，可以通过数字量输入来接通和关闭电机。在接通后，电机将加速到 JOG 设定值。驱动器提供两个JOG 设定值，比如：电机正转设定值和反转设定值。
JOG 的加减速时间和 ON/OFF1 指令的不同，由另外参数设定。

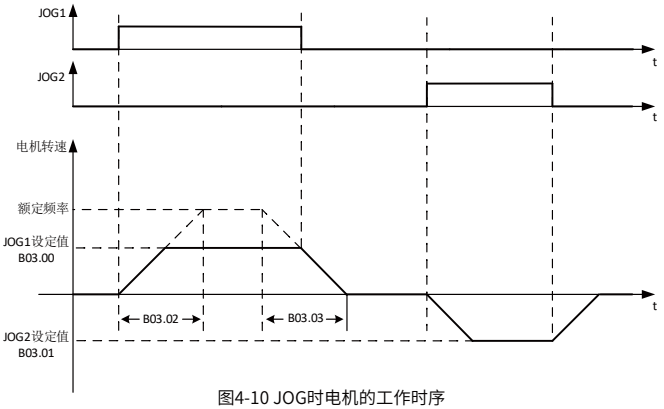


图4-10 JOG时电机的工作时序

注：在给出“JOG”控制指令前，驱动器应在开机准备状态下。若电机已运行，“JOG”指令将不会生效。

JOG设置相关参数

参数编号	参数名称	参数说明
B00.00	启停控制命令来源	选择控制命令来源模块
B00.07	自定义JOG1来源	自定义控制模块的JOG1命令来源设定
B00.08	自定义JOG2来源	自定义控制模块的JOG2命令来源设定
B01.11	端子控制模块JOG1来源	端子控制模块的JOG1命令来源设定
B01.12	端子控制模块JOG2来源	端子控制模块的JOG2命令来源设定
B03.00	JOG1给定设置	JOG1设定值来源选择
B03.01	JOG2给定设置	JOG2设定值来源选择
B03.02	JOG加速时间	JOG点动加速时间设置
B03.03	JOG减速时间	JOG点动减速时间设置

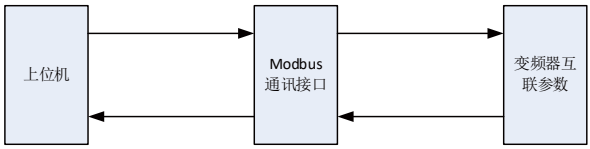
4.2.10通信控制

目前驱动器支持Modbus通信和EtherCAT通信。在通信前进行C00.00配置对应总线类型。

Modbus通信控制

Modbus具体通信协议详见附录。

Modbus通讯的具体结构如下：



Modbus通讯的通讯地址：

通讯地址	名称	定义
0xE720	Modbus通信控制命令	1：启动；2：点动运行；4：减速停车；5：故障复位；6：速度反向
0xE721	Modbus通信设定值1	Modbus通信设定值；设置范围：-600.0%~600.0%
0xE722	Modbus通信设定值2	Modbus通信设定值；设置范围：-600.0%~600.0%

Modbus通讯相关参数：

参数标号	参数名称	参数设定范围
C00.00	总线适配器配套总线类型	0:无 1:Modbus 5:EtherCAT
C02.00	Modbus波特率	0:2400bps 1:4800bps 2:9600bps 3:19200bps 4:38400bps 5:57600bps 6:115200bps
C02.01	Modbus数据格式	0:偶校验（8-E-1） 1:奇校验（8-O-1） 2:无校验（8-N-2） 3:无校验（8-N-1）
C02.02	Modbus本机地址	1~247
C02.03	Modbus应答延迟	0~20ms
C02.04	Modbus通讯超时	0:无效，0.1s~60.0s
C02.06	Modbus通讯设定值单位选择	0:百分比 1:频率
C02.07	Modbus写功能码更新非易失存储	0:更新 1:不更新
P02.32	Modbus通讯启停命令	0~1
P02.33	Modbus通讯点动启停	0~1
P02.35	Modbus通讯故障复位	0~1
P07.32	Modbus控制命令	0~65535
P07.33	Modbus通讯设定值1	-32768~32767
P07.34	Modbus通讯设定值2	-32768~32767
P07.35	Modbus通讯设定值1标幺值	0~65535
P07.36	Modbus通讯设定值2标幺值	0~65535

注：C02.04:Modbus通讯超时，表示连续通信时，两次通讯允许的最大间隔时间。单次通讯C02.04设置为0:无效。

Modbus操作说明：
使用前将C00.00设置为1:Modbus，并按需求配置C02组参数Modbus通讯相关参数，并按照下方表格内容进行参数关联

参数标号	名称	参数设置
B00.00	启停控制命令源	1：自定义控制模块
B00.01	自定义0FF1来源	互联参数：P02.32Modbus启停命令
B00.05	自定义故障复位来源1	互联参数：P02.35Modbus故障复位
B00.06	自定义速度命令取反来源	互联参数：P02.36Modbus反向命令
B00.07	自定义JOG1来源	互联参数：P02.33Modbus点动启停
B02.00	速度控制主设定选择	互联参数：Modbus通信设置标幺值

之后，根据Modbus通信协议进行通讯（详见附录）。

Modbus操作示例：
C02.04通讯超时设置为0:无效，将需要互联的参数进行关联，其余参数按照出厂值设定。
设置目标速度

目标速度	Modbus-RTU 请求帧	P07.33参数值
100%	01 06 E7 21 03 E8 EF CA	1000
50%	01 06 E7 21 01 F4 EF 63	500
0%	01 06 E7 21 00 00 EF 74	0
-50%	01 06 E7 21 FE 0C AF 11	-500
-100%	01 06 E7 21 FC 18 AE 7E	-1000

命令给定
更改P07.32的参数值，会自动更新P02.32~P02.35的参数值

命令	Modbus-RTU 请求帧	P07.32参数值	其他参数变化
启动命令	01 06 E7 20 00 01 7F 74	1	P02.32=1
点动启动	01 06 E7 20 00 02 3F 75	2	P02.33=1
减速停机	01 06 E7 20 00 04 BF 77	4	P02.32=0
故障复位	01 06 E7 20 00 05 7E B7	5	P02.35=1
速度反向	01 06 E7 20 00 06 3E B6	6	P02.36=1

注：
电机启动需要上升沿信号，如果电机不转可以先发01 06 E7 20 00 00 BE B4
反向运行后，发送启动命令报文，变为正向运行

EtherCAT通信控制
EtherCAT具体通信协议详见附录

EtherCAT通讯相关参数：

参数标号	参数名称	参数设定范围
A04.14	驱动器驱动模式选择	0:普通通信模式 1:CoE_VL模式
C00.00	总线适配器配套总线类型	0:无 1:Modbus 5:EtherCAT
C06.00	EtherCAT从站站点正名	0~65535
C06.01	EtherCAT从站站点别名	0~65535
C06.04	EtherCAT状态机	1:初始化 2:预操作 4:安全操作 8:操作
C06.05	EtherCAT协议栈版本	0~655.35
C06.06	CIA402控制字	0~0xFFFF
C06.07	CIA402状态字	0~0xFFFF
C06.08	博能控制器功能块	0:无 1:变频模式功能块

EtherCAT数据传输相关参数：

参数标号	参数名称	参数设定范围
C00.02~C00.17	PZD输出1~ PZD输出16	0:00 其他:模拟量互联参数
C00.18~C00.33	PZD输出1通讯基值~	0~65535
	PZD输出16通讯基值	
C00.34~C00.49	PZD输入1通讯基值~	0~65535
	PZD输入16通讯基值	
C00.50~C00.65	PZD输出1数据显示~	0~0xFFFF
	PZD输出16数据显示	
C00.66~C00.81	PZD输入1数据显示~	0~0xFFFF
	PZD输入16数据显示	
P02.00~P02.15	总线适配器A.PZD1.0~	0~1
	总线适配器A.PZD1.15	
P07.00~P07.15	总线适配器A.PZD1~16	0~65535

注：当通讯基值为0时，通讯基值无效。

C00.02~C00.17存储的是EtherCAT通信发送的实际数据；
C00.66~C00.81存储的是EtherCAT通信接收的实际数据；
C00.50~C00.65存储的是C00.02~C00.17 PZD输出数据按照C00.18~C00.33设定基值，经过计算得到的标幺值；
P07.00~P07.15存储的是C00.66~C00.81 PZD输入数据按照C00.34~C00.49设定基值，经过计算得到的标幺值。
P02.00~P02.15存储的是C00.66 PZD输入1分解位。
AD_EC有两种通信模式，通过A04.14驱动器驱动模式选择，使用前需要设置C00.00为5:EtherCAT，并按照需求设置C06组参数。

◆CoE _VL通讯模式

设置A04.14为1: CoE_VL模式，支持CIA402协议下Velocity mode（详情见附录）

CoE_VL模式下，会自动进行参数互联，互联参数见下表：

参数标号	名称	参数设置
B00.00	启停控制命令源	1：自定义控制模块
B00.01	自定义OFF1来源	互联参数：P02.00总线适配器A.PZD1.0
B00.02	自定义OFF2来源1	互联参数：P02.01总线适配器A.PZD1.1
B00.03	自定义OFF3来源1	互联参数：P02.02总线适配器A.PZD1.2
B00.04	自定义运行允许来源	互联参数：P02.03总线适配器A.PZD1.3
B00.05	自定义故障复位来源1	互联参数：P02.07总线适配器A.PZD1.7
B00.06	自定义速度命令取反来源	互联参数：P02.11总线适配器A.PZD1.11
B00.15	斜坡函数发生器(RFG)禁止来源	互联参数：P02.04总线适配器A.PZD1.4
B00.16	斜坡函数发生器(RFG)暂停来源	互联参数：P02.05总线适配器A.PZD1.5
B00.17	斜坡函数发生器(RFG)给定置0来源	互联参数：P02.06总线适配器A.PZD1.6
B02.00	速度控制主设定选择	互联参数：P07.01总线适配器A.PZD2

◆普通通信模式：

由用户自定义EtherCAT通讯收发参数，厂家提供T-PZD1~16共16个发送参数，和R-PZD1~16共16个接收参数，供用户自行配置使用（详情见附录）。

T-PZD1~16的发送数据由C00.66~C00.81 PZD输入数据显示；

R-PZD1~16的接收数据由C00.50~C00.65 PZD输出数据显示；

普通通信模式下，打开C06.08博能控制器功能块，设置为1:变频模式功能块，会自动进行部分参数互联，互联参数见下表，若用户还需互联其他参数，可自行设置：

参数标号	名称	参数设置
B00.00	启停控制命令源	1：自定义控制模块
B00.01	自定义OFF1来源	互联参数：P02.00总线适配器A.PZD1.0
B00.02	自定义OFF2来源1	互联参数：P02.01总线适配器A.PZD1.1
B00.03	自定义OFF3来源1	互联参数：P02.02总线适配器A.PZD1.2
B00.04	自定义运行允许来源	互联参数：P02.03总线适配器A.PZD1.3
B00.05	自定义故障复位来源1	互联参数：P02.07总线适配器A.PZD1.7
B00.06	自定义速度命令取反来源	互联参数：P02.11总线适配器A.PZD1.11
B00.15	斜坡函数发生器(RFG)禁止来源	互联参数：P02.04总线适配器A.PZD1.4
B00.16	斜坡函数发生器(RFG)暂停来源	互联参数：P02.05总线适配器A.PZD1.5
B00.17	斜坡函数发生器(RFG)给定置0来源	互联参数：P02.06总线适配器A.PZD1.6
B02.00	速度控制主设定选择	互联参数：P07.01总线适配器A.PZD2
C00.02	PZD输出1	互联参数：P12.07状态字1
C00.03	PZD输出2	互联参数：P13.00马达实际速度
C00.04	PZD输出3	互联参数：P06.08输出电流
C00.05	PZD输出4	互联参数：P06.11输出转矩
C00.06	PZD输出5	互联参数：P12.03当前故障

注：更改C06.08博能控制器功能块，需要重新连接EtherCAT通信（或断电上电）后，才会自动互联参数（或取消互联参数）。且博能控制器功能块，仅在普通通信模式下有效。

AD为用户提供自定义EtherCAT控制方式，A04.14选择0:普通通信模式，C06.08选择0:无，取消博能控制器功能块后，用户可完全根据自己的需求进行参数关联控制。接收数据由C00.02~C00.17 PZD输出1~16设置，马达控制由用户自定义互联参数P07.00~P07.15和P02.00~P02.15控制。

4.2.11控制字和状态字

控制字

位号	定义	说明
0	0 = OFF1	电机按斜坡函数发生器的减速时间制动。达到静态后驱动器会关闭电机。
	0 → 1 = ON	bit2，bit3，bit4均为1时，驱动器进入“运行”状态。
1	0 = OFF2	电机立即关闭，惯性停车。
	1 = OFF2 不生效	可以接通电机
2	0 = 快速停机（OFF3）	快速停机：电机按 OFF3 减速时间制动，直到达到静态。
	1 = 快速停机无效（OFF3）	可以接通电机
3	0 = 禁止运行	立即关闭电机
	1 = 使能运行	接通电机
4	0 = 封锁斜坡函数发生器；驱动器将斜坡函数发生器的输出设为0	驱动器将斜坡函数发生器的输出设为 0。
	1 = 不封锁斜坡函数发生器	允许斜坡函数发生器使能。
5	0 = 停止斜坡函数发生器	斜坡函数发生器的输出保持在当前值。
	1 = 使能斜坡函数发生器	斜坡函数发生器的输出跟踪设定值。
6	0 = 封锁设定值	电机按斜坡函数发生器减速时间制动。
	1 = 使能设定值	电机按加速时间升高到速度设定值。
7	0 → 1 = 复位故障	复位故障。如果仍存在 ON指令，驱动器进入“开机封锁”状态；故障仍然存在，复位指令无效。
8	1 = 点动运行命令1	点动命令接通电机
9	1 = 点动运行命令2	点动命令接通电机
10	预留	
11	1 = 换向	取反驱动器内的设定值。
12	1 = 电动电位器增加	提高保存在电动电位器中的设定值。
13	1 = 电动电位器减少	降低保存在电动电位器中的设定值。
14	1 = 产生外部故障	外部信号产生故障，驱动器停机
15	预留	

控制字

位号	定义	说明
0	1=开机准备好	电源已接通，驱动器处于运行前状态
1	1=运行准备	电机已经接通（ON/OFF1= 1），当前没有故障。收到“运行使能”指令，驱动器会接通电机。
2	1 = 运行已使能	当前允许驱动器运行
3	1 = 出现故障	在驱动器中存在故障
4	1 = OFF2 未激活	惯性停车功能未激活。
5	1 = OFF3 未激活	快速停止未激活。
6	1 = 接通禁止有效	当前处于开机封锁状态，只有OFF1=0且OFF2、OFF3、运行允许均为1的情况下，可退出当前状态
7	1 = 出现报警	电机保持接通状态，无需应答。
8	1 = 转速差在公差范围内	“设定/实际值”差在公差范围内。
9	1 = 本地控制请求控制	请求自动化系统控制驱动器。
10	1 = 达到或超出比较转速	转速大于或等于最大转速。
11	1 =达到电流限值或转矩限值	达到或超出电流或转矩的比较值。
12	预留	
13	1 = 电机正转	驱动器内部实际值 > 0。
14	预留	
15	预留	

4.3设定值

4.3.1概述

驱动器通过设定值源收到主设定值。主设定值大多是规定电机目标转速。

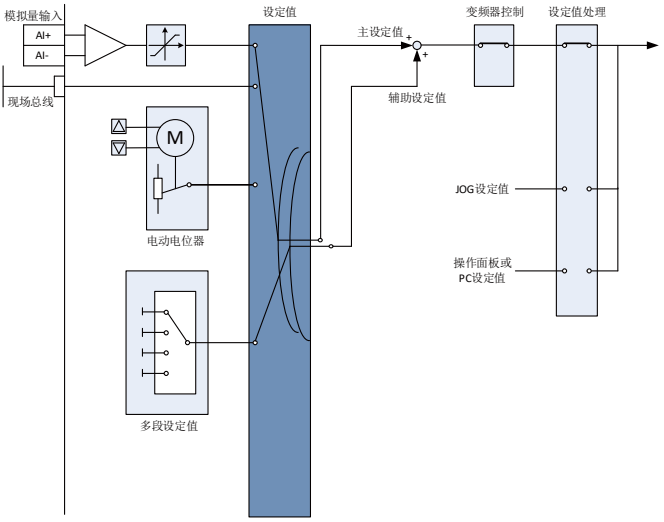


图4-11 驱动器的设定值处理

主设定值的来源可以是：
◆驱动器的模拟量输入
◆驱动器的现场总线接口
◆驱动器内部电位器
◆驱动器内模拟的电动电位器
◆驱动器内保存的固定设定值
驱动器通过B02.00选择主设定值来源，例如：当B02.00选择3:内部电位器，可通过调节驱动器上的旋钮，进行主设定值给定。
上述来源也可以是辅助设定值或者附加设定值的来源。

在以下条件下，驱动器控制会从主设定值切换为其他设定值：
◆相应互联的工艺控制器激活时，工艺控制器的输出会给定电机转速。
◆JOG激活时。
◆由操作面板或PC工具Eoperation控制时。

4.3.2模拟量输入设定为设定值

互联模拟量输入
当您选择不带模拟量输入功能的标准设置时，必须将主设定值的参数和一个模拟量输入互联在一起。

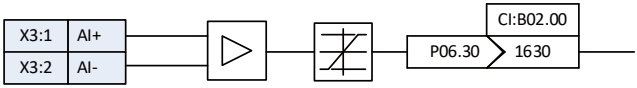


表4-7 模拟量输入设为设定值

参数	注释
B02.00设置为P06.30	速度来源主设定值选择 主设定值与模拟量输入互联
B02.01设置为P06.30	速度来源辅助设定值选择 辅助设定值与模拟量输入互联
B02.02设置为P06.30	速度来源附加设定值选择 附加设定值与模拟量输入互联

4.3.3现场总线设定为设定值

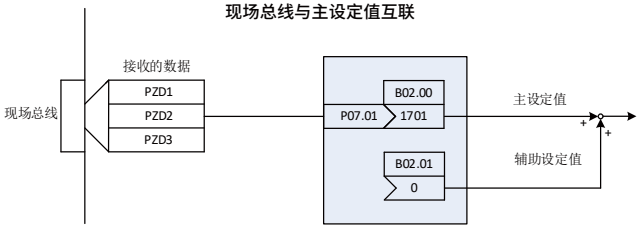


图4-12 现场总线设为设定值

注：大多数标准报文将转速设定值作为第二个过程数据 PZD2 来接收和发送。

表4-8现场总线设定为设定值

参数	注释
B02.00设置为P07.01	速度来源主设定值选择 主设定值与现场总线适配器的过程数据PZD2互联
B02.01设置为P07.01	速度来源辅助设定值选择 辅助设定值与现场总线适配器的过程数据PZD2互联
B02.02设置为P07.01	速度来源附加设定值选择 附加设定值与现场总线适配器的过程数据PZD2互联

4.3.4电动电位器设定为设定值

“电动电位器”功能用来模拟真实的电位器。电动电位器的输出值可通过控制信号“升高”和“降低”调整。

电动电位器与设定值源互联

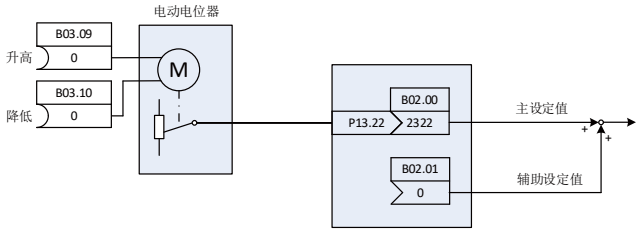


图4-13 电动电位器设定为设定值

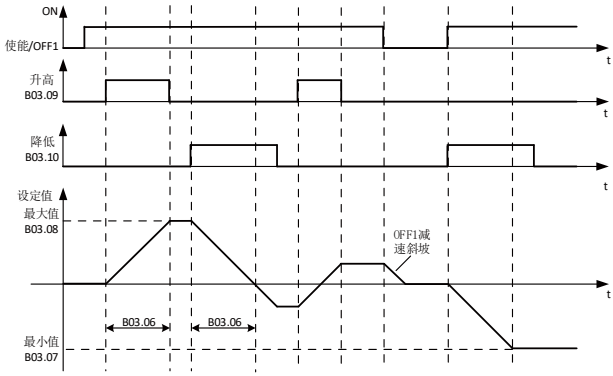


图4-14 电动电位器的功能图

表4-9 电动电位器的基本设置

参数	描述
B03.04	0:禁止
	1:开启
B03.05	电动电位器初始值
B03.06	电动电位器斜坡时间
B03.07	电动电位器最小值
B03.08	电动电位器最大值
B03.09	电动电位器增加来源选择
B03.10	电动电位器下降来源选择

注:初始值在以下三种情况生效:1.断电上电;2.电动电位器切换为有效;3.初始值发生变动。

4.3.5 多段速设定为设定值

在很多应用中，只需要电机在通电后以固定转速运转，或在不同的固定转速之间来回切换，示例：输送带在接通后只使用两个不同的速度运行。

固定转速与主设定值互联

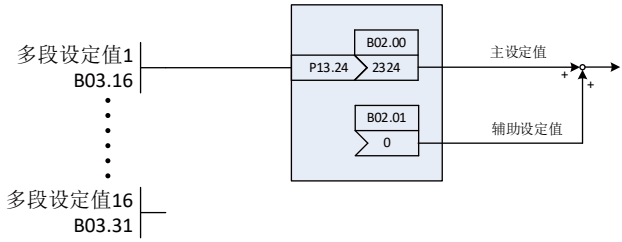


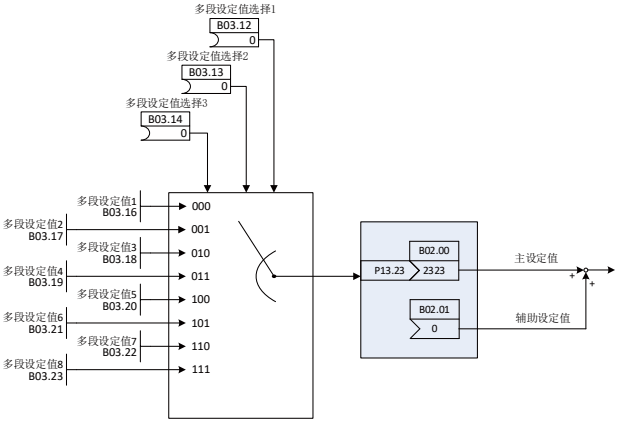
图4-15 固定转速设为设定值

表4-10 固定转速设定设定值

参数	注释
B02.00设置为P13.24	速度来源主设定值选择 主设定值与多段设定值1互联

二进制选择多段设定值

设置 8 个不同的固定设定值。通过三个选择位的不同组合，您可以准确地从 8 个中选择一个固定设定值。



用于设置多段设定值的相关参数

参数	描述
B03.11	多段给定值 只读参数，显示当前多段设定的输出值
B03.12	多段给定值选择1
B03.13	多段给定值选择2
B03.14	多段给定值选择3
B03.16	多段设定值1
B03.17	多段设定值2
B03.18	多段设定值3
B03.19	多段设定值4
B03.20	多段设定值5
B03.21	多段设定值6
B03.22	多段设定值7
B03.23	多段设定值8

4.4设定值处理

4.4.1设定值处理一览

设定值处理可以对设定值进行以下修改：

◆取反设定值，以切换电机旋转方向（反转）。

◆禁止正/负旋转方向，例如：在输送带、电泵或风机应用中。

◆设置最大转速限制，以保护电机和机械装置。

◆设置斜坡函数发生器，以控制电机的加速和减速过程，输出理想扭矩。

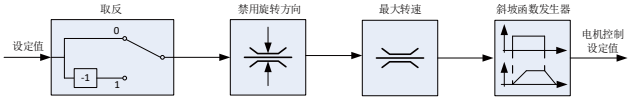
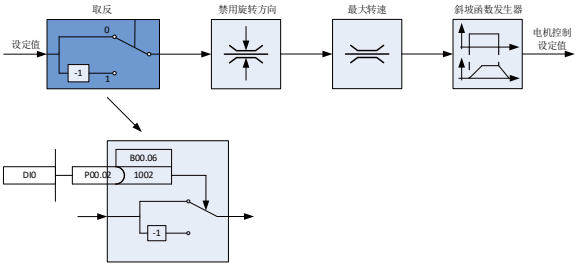


图5-X驱动器内的设定值处理

4.4.2取反设定值

驱动器上可通过位切换设定值符号。示例中展示的是通过数字量输入取反设定值。



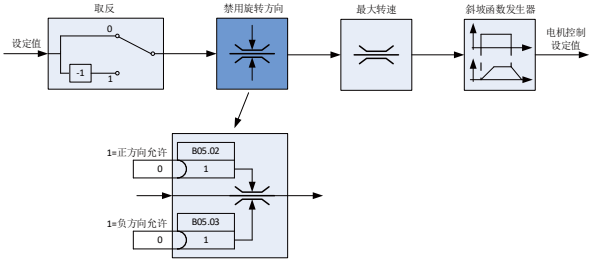
将参数 B00.06和一个二进制信号（如数字量输入0）互联，以通过数字量输入 DI0取反设定值。

表4-11 设置设定值取反的示例

参数	注释
B00.06设置为P00.02	设定值取反 数字量输入 0 = 0： 设定值保持不变。 数字量输入 0 = 1： 驱动器对设定值取反。
B00.06 设置为P02.01	通过过程数据1的bit1位取反设定值

4.4.3禁止旋转方向

在驱动器出厂设置中，电机的正负旋转方向都已使能。



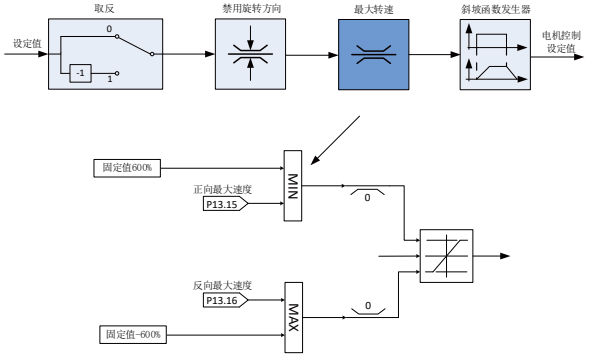
如需禁用旋转方向，应将相应的参数设为 0。

表4-12 设置旋转方向禁止的示例

参数	注释
B05.02设置为0	正方向允许选择 禁止电机正方向旋转
B05.00设置为P00.03	负方向允许选择 数字量输入 1= 0： 负旋转方向已禁止。 数字量输入 1= 1： 负旋转方向已使能。

4.4.4最大转速

最大转速可以限制两个旋转方向的转速设定值。



一旦超出该值，驱动器便输出报警或故障信息。
当需要依方向而定来限制转速时，可以确定每个方向的最大转速。

表4-13 用于限制转速的参数

参数	参数名称
B06.04	正向极限速度
B06.05	反向极限速度
D00.06	电机最大转速

4.4.5斜坡函数发生器

设定值通道中的斜坡函数发生器用于限制转速设定值的变化速率（加速）。减慢的加速会使得电机加速转矩降低。这样电机就可以减负且生产设备也得到了保护。
有两种斜坡函数发生器可供选择：
◆简单斜坡函数发生器
简单斜坡函数发生器限制加速度，但不限制加速度的变化（急动度）。
◆扩展斜坡函数发生器
扩展斜坡函数发生器不仅限制加速度，而且还通过设定值圆整对加速度的变化（急动度）进行限制。如此一来便不会突然形成电机转矩。

简单斜坡函数发生器

简单斜坡函数发生器是指加减速过程中不采用S曲线（圆弧）时间。

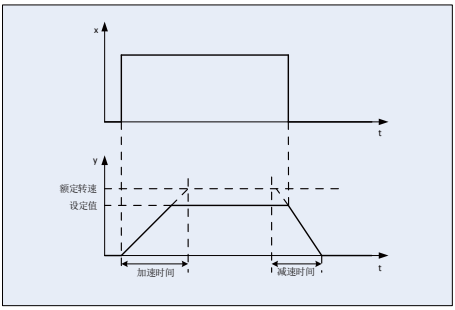
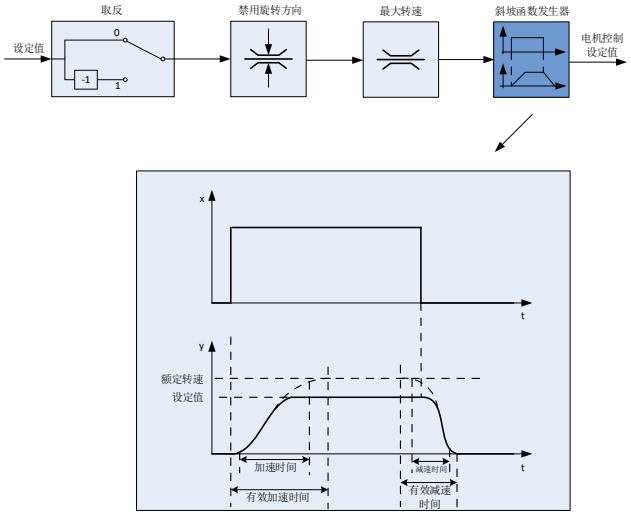


表4-14 简单斜坡函数发生器的参数设置

参数	参数说明	描述
B04.02	斜坡1加速时间	指电机从零加速到额定转速的时间，单位为s
B04.03	斜坡1减速时间	指电机从额定转速下降到零的时间，单位为s
B04.04	斜坡2加速时间	指电机从零加速到额定转速的时间，单位为s
B04.05	斜坡2减速时间	指电机从额定转速下降到零的时间，单位为s
B04.06	斜坡3加速时间	指电机从零加速到额定转速的时间，单位为s
B04.07	斜坡3减速时间	指电机从额定转速下降到零的时间，单位为s
B04.08	斜坡4加速时间	指电机从零加速到额定转速的时间，单位为s
B04.09	斜坡4减速时间	指电机从额定转速下降到零的时间，单位为s
B05.33	OFF3停机时间	急停功能 (OFF3) 具有一个单独的减速时间。

扩展斜坡函数发生器

扩展斜坡函数发生器的加速时间和减速时间是可以单独设置的。这两个时间只和实际应用紧密相关，可以是几百毫秒（如输送带传动），也可以是几分钟（如离心机）



起始段S曲线和结束段S曲线可以实现平滑加速和减速。

电机的加速时间和减速时间会加上S曲线时间，且S曲线时间与设定频率无关（以第一组时间为例）：

◆有效的加速时间 = B04.02 + 0.5 × (B04.10 + B04.11)。

◆有效的减速时间 = B04.03 + 0.5 × (B04.10 + B04.11)。

表4-15 扩展斜坡函数发生器的参数设置

参数	参数名称	描述
B04.02	斜坡1加速时间	指电机从零加速到额定转速的时间，单位为s
B04.03	斜坡1减速时间	指电机从额定转速下降到零的时间，单位为s
B04.04	斜坡2加速时间	指电机从零加速到额定转速的时间，单位为s
B04.05	斜坡2减速时间	指电机从额定转速下降到零的时间，单位为s
B04.06	斜坡3加速时间	指电机从零加速到额定转速的时间，单位为s
B04.07	斜坡3减速时间	指电机从额定转速下降到零的时间，单位为s
B04.08	斜坡4加速时间	指电机从零加速到额定转速的时间，单位为s
B04.09	斜坡4减速时间	指电机从额定转速下降到零的时间，单位为s
B04.10	S曲线1开始时间	扩展斜坡函数发生器的起始段S曲线时间。该值对加速和减速过程都有效。
B04.11	S曲线1结束时间	扩展斜坡函数发生器的结束段S曲线时间。该值对加速和减速过程都有效。
B04.12	S曲线2开始时间	扩展斜坡函数发生器的起始段S曲线时间。该值对加速和减速过程都有效。
B04.13	S曲线2结束时间	扩展斜坡函数发生器的结束段S曲线时间。该值对加速和减速过程都有效。
B04.14	S曲线3开始时间	扩展斜坡函数发生器的起始段S曲线时间。该值对加速和减速过程都有效。
B04.15	S曲线3结束时间	扩展斜坡函数发生器的结束段S曲线时间。该值对加速和减速过程都有效。
B04.16	S曲线4开始时间	扩展斜坡函数发生器的起始段S曲线时间。该值对加速和减速过程都有效。
B04.17	S曲线4结束时间	扩展斜坡函数发生器的结束段S曲线时间。该值对加速和减速过程都有效。

设置扩展斜坡函数发生器

按如下步骤设置扩展斜坡函数发生器：
1. 给出一个尽可能大的转速设定值。
2. 接通电机。
3. 检查电机的运转情况。
–如果电机加速过慢，请缩短加速时间。
过短的加速时间会导致电机在加速时达到电流限值且暂时无法再跟踪转速设定值。此时，驱动器会超出所设时间。
–如果电机加速过快，延长加速时间。
–如果加速过急，延长起始段圆弧时间。
–我们建议将结束段圆弧时间设为和起始段圆弧时间相同的值。
4. 关闭电机。
5. 检查电机的运转情况。
–如果电机减速过慢，缩短减速时间。
最小的有效减速时间取决于具体应用。
当减速时间过短时，驱动器会超出电机的电流限值，驱动器内的直流母线电压会变得过高，幅度取决于所用的功率模块型号。
实际制动时间会超出所设的减速时间或驱动器在制动时发生故障，具体取决于驱动器的设置。
–电机制动过快或制动时驱动器发生故障，则需延长减速时间。
6. 重复第 1 到第 5 步，直到获得符合电机或设备要求的驱动特性。

4.5电机控制

驱动器有以下两种转速控制方式，可根据不同应用场合的实际需求选择。

功能码	参数名称	出厂值	设定范围	描述
B05.00	电机控制方式	0	0~1	0：VF 1：SVC（不带编码器的矢量控制）

VF：给定频率指令后，驱动器根据VF特性曲线控制输出电压，控制电机运行。由于没有速度反馈调节，转速控制精度不够高，VF控制适用于风机、水泵等通用性负载，或一台驱动器带多台电机，或驱动器功率与电机功率差异较大的应用场合。在对转速精度有较高要求的应用场合，可选择矢量控制方式。

SVC：即不带编码器的开环矢量控制，适用于通常的高性能控制场合，原则上一台驱动器只能驱动一台电机，如机床、离心机等负载；

*注：SVC方式下，一台驱动器驱动多台电机的话，电机参数必须一致且刚性连接。

4.5.1电机参数辨识

不论选择哪种电机控制方式，在运转电机前，都必须按电机铭牌准确设置电机基本参数。（以电机0为例，下同）

功能码	参数名称	出厂值	设定范围	描述
A04.16	电机类型选择	0	0~1	0:MP 1:MH
D00.00	电机类型选择	0	0~1	0：异步电机 1：永磁同步电机
D00.01	电机额定功率	0.55	0.00~655.35kW	电机铭牌参数
D00.02	电机额定电压	400	0~1500V	
D00.03	电机额定电流	1.6	0.00~655.35A	
D00.04	电机额定频率	50	0.0~600.00Hz	
D00.05	电机额定转速	1330	0~65535rpm	

选择电机控制方式为矢量控制时，需要准确的电机参数，为了获得更好的电机控制性能，需对被控电机进行参数辨识。

功能码	参数名称	出厂值	设定范围	描述
B00.21	辨识请求	0	0~3	0：无 1：异步电机简易静态辨识 2：异步电机静态完整辨识 3：异步电机动态完整辨识

三种参数辨识模式的区别如下表所示，请根据实际应用场合选择：

模式	使用条件	辨识参数	描述
异步电机简易静态辨识	电机无法运转	定子电阻	
异步电机静态完整辨识	电机无法运转	定子电阻 转子电阻 漏感 互感 空载电流	辨识前请确保电机与负载机械分离，运行无危险；若电机连接负载，辨识结果可能会不够准确
异步电机动态完整辨识	电机可以运转		

电机参数辨识步骤如下：
1、根据当前电机选择，正确设置D组电机基本参数；
2、根据驱动器控制模式、系统机械状态等条件选择参数辨识模式；
3、按下RUN即开始参数辨识，如过程中想终止辨识请按STOP键，辨识结束后面板将显示STOP状态。
辨识结束后，以下参数辨识结果将自动保存。在知道电机准确参数的前提下可以不进行辨识，手动输入参数。

功能码	参数名称	出厂值	设定范围	描述
D01.00	异步电机定子电阻	14.477	0.000~65.535ohm	参数辨识或手动输入
D01.01	异步电机转子电阻	8.469	0.000~65.535ohm	
D01.02	异步电机漏感抗	51.3	0.00~655.35mH	
D01.03	异步电机互感抗	545.3	0.00~6553.5mH	
D01.04	异步马达空载电流	1.28	0.00~655.35mH	

4.5.2V/F控制

V/F曲线

驱动器可根据不同的负载特性选择V/F特性曲线，以下参数仅在控制模式为VF时有效。

功能码	参数名称	出厂值	设定范围	描述
B07.00	VF模式选择	0	0	0：VF曲线
B07.01	VF曲线选择	0	0~3	0：直线VF 1：多点VF 2：平方VF 3：1.5次VF

0：直线VF，适用于转矩不依赖于转速的场合，如普通恒转矩负载
1：多点VF，适用于脱水机、离心机等特殊负载
2：平方VF，适用于所需转矩随着转速升高而升高的场合，如风机、水泵等离心负载
3：1.5次VF，介于直线VF与平方VF曲线之间

VF曲线如图所示。

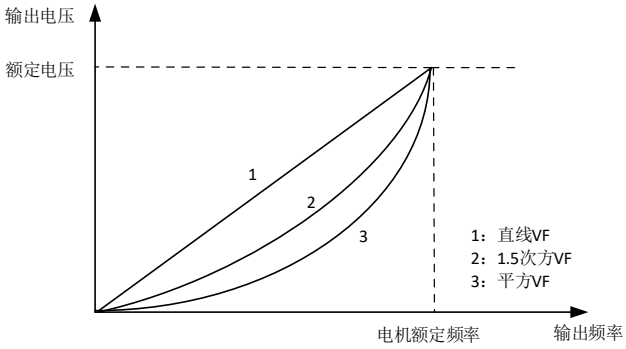


图4-17 VF曲线

多点VF曲线由参数B07.02~B07.07定义，设定曲线时必须满足：频率点设置B07.02＜B07.04＜B07.06，电压点设置B07.03＜B07.05＜B07.07。参数设定值应根据负载特性确定，否则可能无法正常运行。低频时电压设定过高可能会导致电机过热甚至烧毁，驱动器可能会报过流故障。

功能码	参数名称	出厂值	设定范围	描述
B07.02	多点VF曲线频率点1	2	0.0~B07.04	选择多点VF的频率点
B07.03	多点VF曲线电压点1	20	0.0~B07.05	选择多点VF的电压点
B07.04	多点VF曲线频率点2	20	B07.02~B07.06	选择多点VF的频率点
B07.05	多点VF曲线电压点2	152	B07.03~B07.07	选择多点VF的电压点
B07.06	多点VF曲线频率点3	40	B07.04~D00.04	选择多点VF的频率点
B07.07	多点VF曲线电压点3	304	B07.05~D00.02	选择多点VF的电压点

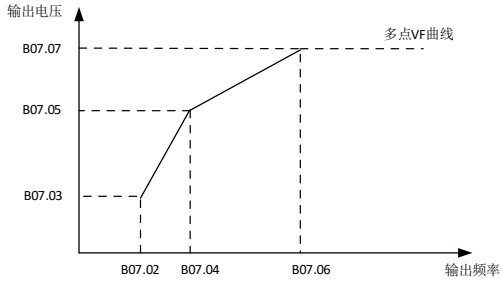


图4-16 VF曲线

转矩提升

转矩提升:补偿VF控制低频转矩特性,通过增大驱动器输出电压提升输出转矩。

当负载较大起动力矩不够时,可适当增大转矩提升B07.15的值,负载较小时,可适当减小。该参数不宜设置过大,否则容易导致电机过热或驱动器过流故障,建议设置时以1%为步进值逐步增加,设置后运行电机查看参数A00.08(输出电流),该值不宜超过D00.03(电机额定电流)。

功能码	参数名称	出厂值	设定范围	描述
B07.13	VF转矩提升方式	1	0~2	0: 不使能 1: 手动 2: 自动
B07.15	VF手动转矩提升	1	0%~50%	提升电压为电机额定电压的百分比
B07.16	VF转矩提升截止频率	50	0.00~100.00	频率设定大于该值后，转矩提升无效

注:多点VF、VF分离、参数辨识、转速追踪状态下,转矩提升无效。

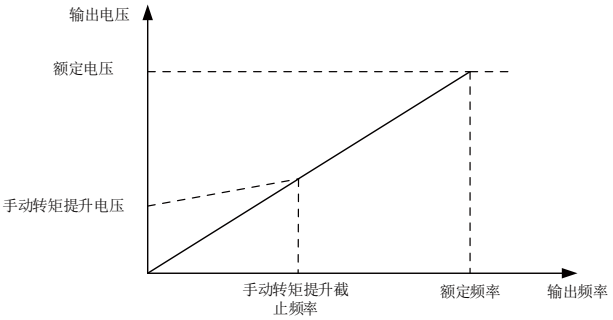


图4-18 手动转矩提升示意图

振荡抑制

VF振荡抑制功能默认关闭,只有电机VF运行存在明显振荡时,才需要开启。振荡抑制增益越大,抑制效果越明显,但该值过大可能会对正常运行造成不利影响,应在能有效抑制振荡的数值范围内,尽量选取较小的值。

功能码	参数名称	出厂值	描述
B07.20	VF振荡抑制模式	0	0: 无效 1: 有效
B07.21	VF振荡抑制增益	10	

4.6保护功能

4.6.1过电流保护

在矢量控制中，电机电流始终保持在设置的转矩限值范围内。
如果使用 V/F 控制，则无法设置转矩限值。V/F控制通过限制输出频率和电机电压防止电机过载（Imax 控制器）。

Imax 控制器

矢量控制时，电机电流受转矩限幅的限制，VF控制时，驱动器通过调节输出频率来限制电流。若电机加速过程中，电流超过设定阈值，控制器生效，自动降低输出频率，使电流维持在设定值左右，实际加速时间延长。若电机减速过程中生效，则提高输出频率，实际减速时间延长。过程如下图所示：

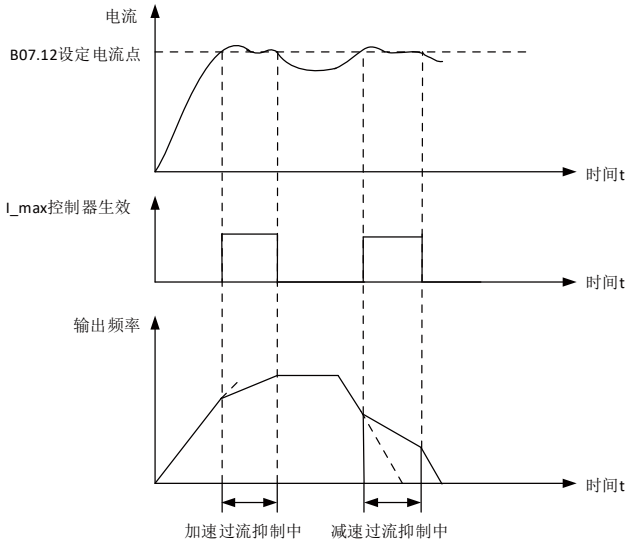


图4-19 过流抑制过程示意图

设置

如果电机在达到电流限值时容易振动，或会由于过电流而跳闸，必须修改 Imax控制器的出厂设置。

表4-16 Imax 控制器的参数

功能码	参数名称	出厂值	描述
B07.10	Imax控制使能	1	0：无效 1：有效
B07.11	Imax控制调频增益	30	调频增益越大，频率调节越快，实际加减速时间越短
B07.12	Imax抑制点	150%	Imax控制开始动作电流点，驱动器额定电流的百分比

注：
如果打开该功能仍然容易触发过流故障，可适当减小B07.12（抑制点）或增大B07.11（控制调频增益）。

4.6.2直流母线电压过压抑制

电机如何引起过电压?
当异步电机被相连的负载驱动时,电机作为发电机工作,发电机将机械能转换为电能。电能又返回到驱动器中。如果驱动器不能将电能传输至制动电阻,则驱动器中的直流母线电压 Vdc 会升高。过高的直流母线电压不仅会损坏驱动器,还会损坏电机。在它达到危险水平前,驱动器会关闭相连电机,并发出故障信息“直流母线过电压”。

电机和驱动器的过电压保护
只要应用允许,Vdc_max 控制器就会避免直流母线电压过高。Vdc_max控制器会延长电机停车时间,使电机只向驱动器反馈少量电能,而这些电能又能以驱动器损耗的形式完全消耗掉。电机运行在发电状态时,电能回馈至直流母线侧,母线电压上升,如果驱动器未接制动电阻,母线电压升高至过压点后,将触发过压故障。过压抑制功能则可以尽可能避免母线电压过高。
电机急减速时,母线电压迅速上升,超过设定阈值后,Vdc_max控制器生效。矢量控制时,通过限制输出转矩最大值,调节输出频率;VF控制时,直接调节输出频率,延长实际减速时间,减少回馈至母线的电能,使母线电压维持在设定值左右。过程如下图所示:

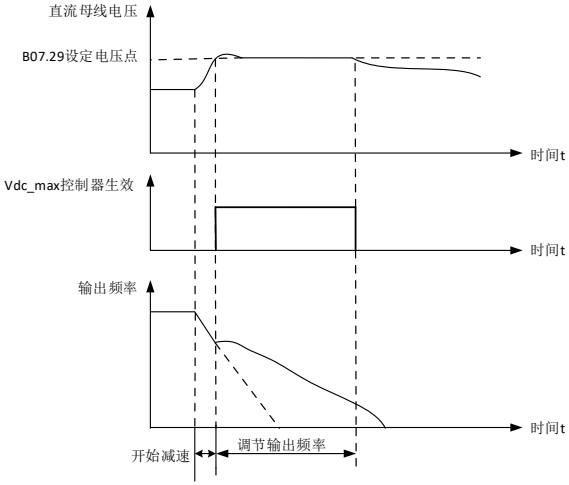


图4-20 过压抑制过程示意图

表4-17 Vdc_max控制器参数

功能码	参数名称	出厂值	描述
B07.28	Vdc_max控制开关	0	0：禁止 1：使能
B07.29	Vdc_max电压裕量	125%	Vdc_max控制开始动作电压点，基准母线电压的百分比

注:
1)如果打开该功能仍然容易触发过压故障,可适当减小B07.29(Vdc_max电压裕量)。
2)Vdc_max控制器不适合用于电机长时间输出再生电能的应用。例如:起重机应用或者大型摆动物体的制动。

4.6.3直流母线电压欠压抑制

驱动器带大惯量负载运行时，如果出现母线电压骤降或电源掉电的情况，母线电压降低至欠压点后，将触发欠压故障导致电机自由停车。由于负载惯量较大，电压恢复正常后，电机可能仍在高速运行，立即启动容易造成过流故障。

欠压抑制功能能够利用负载动能尽可能使驱动器继续工作，控制电机有规律地降频运行。当母线电压降低到设定阈值后，Vdc_min控制器生效，驱动器自动降低输出频率，使电机处于发电状态，电能回馈至直流母线侧，使母线电压维持在设定值左右。电源正常后，驱动器恢复掉电之前的运行状态。过程如下图所示：

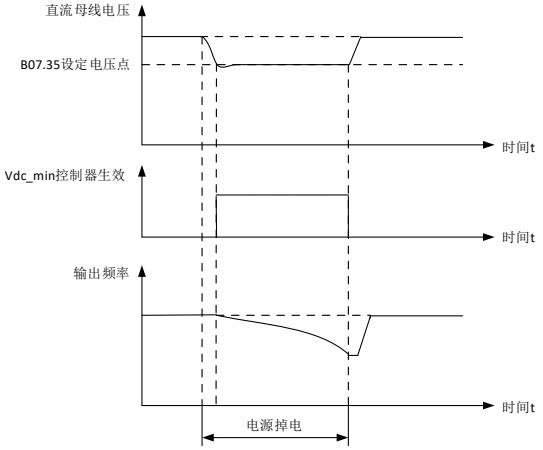


图4-21 欠压抑制过程示意图

表4-18 Vdc_max控制器参数

功能码	参数名称	出厂值	描述
B07.34	Vdc_min控制开关	0	0：禁止 1：使能
B07.35	Vdc_min调压增益系数	85%	Vdc_min控制开始动作电压点，基准母线电压的百分比

注：

如果打开该功能仍然容易触发欠压故障，可适当增大B07.35（Vdc_min调压增益系数）。

4.7应用特色功能

4.7.1直流制动

直流制动：驱动器输出直流电使电机制动停机，比正常减速停机时间短。直流制动将电机制动能量转化为热能，可避免电机将制动能量回馈至驱动器，驱动器不必处理再生功率，适用于不向电网回馈能量的应用场合，如离心机、锯床、磨床、输送带等。

直流制动分为以下两种情况：

1.停机时直流制动

电机惯量较大时，减速停机过程中会因惯性而旋转。当停机时直流制动时间（B05.11）大于0时，停机直流制动功能开启，电机开始减速停机后，当电机转速低于停机直流制动起始速度（B05.12）时，驱动器将开始直流制动，按照B05.11设定的时间，输出设定的直流制动电流（B05.09），电机制动减速为0。停机直流制动过程如下图所示。

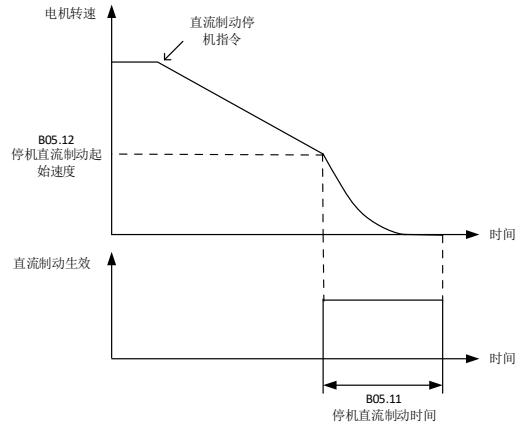


图4-22 停机时直流制动过程示意图

2.启动时直流制动

如果想要启动电机时电机因受外力或惯性原因处于自由旋转状态，选择直接启动（B05.04 = 0）方式可能会导致驱动器过压或者过流故障，此时可以选择直流制动启动（B05.04 = 3）或者转速追踪启动（B05.04 = 2）。设置启动时直流制动时间（B05.10），电机将会先制动减速为0，再重新启动运行至指定频率。启动直流制动过程如下图所示。

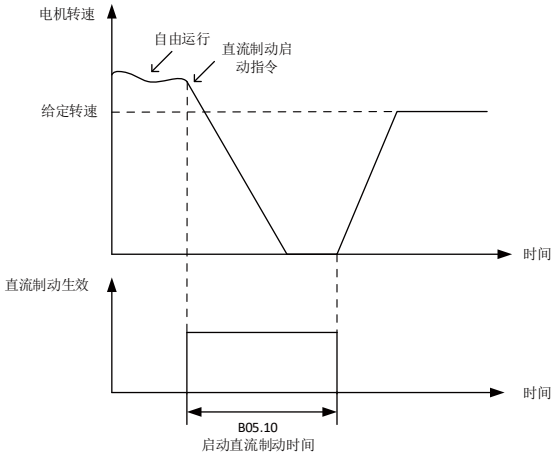


图4-23 启动时直流制动过程示意图

功能码	参数名称	出厂值	设定范围	描述
B05.04	电机启动方式	0	0~3	0：直接启动 1：预励磁启动 2：转速追踪启动 3：直流制动启动
B05.09	直流制动电流	50	0.0%~100.0%	直流制动时的制动电流设置 100.0%对应电机额定电流
B05.10	启动时直流制动时间	0	0.00s~100.00s	启动时直流制动时间设置 0为无直流制动启动
B05.11	停机时直流制动时间	0	0.00s~100.00s	停机时直流制动时间设置 0为停机时无直流制动过程
B05.12	停机直流制动起始速度	0	0~3000rpm	停机直流制动的起始速度

注:
◆直流制动功能仅在异步电机上可用。
◆直流制动可以在运行过程中切换。
◆直流制动会使电机剧烈受热,制动特性不明确,没有恒定的制动力矩,在静止状态下没有制动力矩,制动能量转化为热量消耗,电网掉电时不能使用。
◆电机若长时间或经常以直流制动方式制动,会造成电机过热,可能会导致电机损坏。请在使用时检查电机温度,如果电机温度过高,应给电机更长的冷却时间或者选用其他制动方式。

4.7.2转速追踪

驱动器驱动电机起动时,电机可能由于某些原因处于旋转状态,比如风力作用下风机自转、停机后大惯量负载带动电机旋转。如果驱动器直接从0Hz开始启动,由于输出频率和电机实际频率相差过大,极容易导致过流故障。转速追踪功能可检测出电机实际转速,从当前转速开始运行,避免起动时过流。
驱动器接收到运行命令后,判断电机旋转方向,向电机注入电流(转速追踪电流设定值),从设置的起始频率开始向下搜索,起始频率为停机频率时,搜索速度最快。搜索到当前电机转速后,经过切换等待时间,电机将平滑地过渡到正常运行模式,到达设定频率。

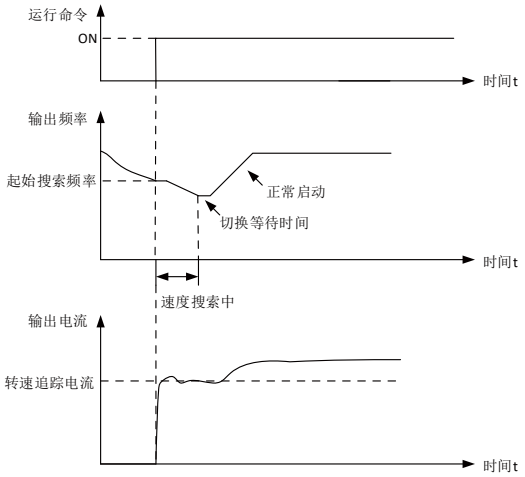


图4-24 转速追踪过程示意图

表4-19转速追踪相关参数设置

功能码	参数名称	出厂值	描述
B05.13	转速追踪模式	0	0:转速追踪关闭 1:从停机频率开始搜索 2:从额定频率开始搜索 3:从最大频率开始搜索
B05.14	转速追踪速度搜索时间	25.0s	频率从50Hz减至0Hz的时间
B05.15	转速追踪电流百分比	50%	速度搜索电流, 电机额定电流的百分比
B05.16	转速追踪最小频率限制	2Hz	低于该频率直接启动, 转速追踪不动作
B05.17	转速追踪切换等待时间	250ms	转速追踪模式切换为正常运行模式的等待时间

注:
若搜索时间过长,请适当减小搜索时间。
若搜索过程中出现过流或过压故障,请适当增大搜索时间。

4.7.3自动重启

自动重启包含了两种功能：
◆驱动器自动复位故障信息
◆故障复位后，驱动器自动重启电机

设置故障自动复位
故障自动复位功能的实现由以下方面决定：
故障复位重置时间：一定时间内的故障自动复位处理，开始计时取决于自动复位故障使能后的第一次发生故障的时间。
故障复位间隔时间：两次故障复位命令之间的最小间隔时间。
故障复位次数：在故障复位重置时间内，最多产生故障复位命令的次数，超过这个次数后，将不再产生故障复位命令，除非故障复位重置时间结束。

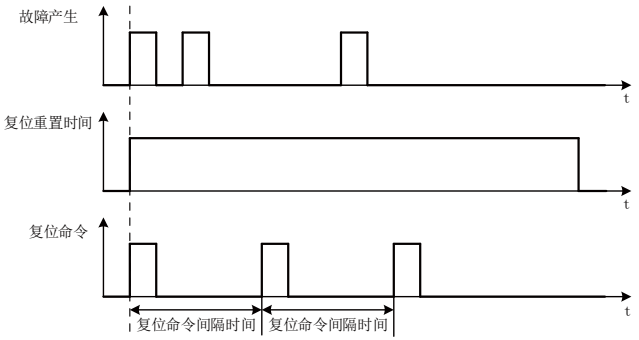


图4-25 故障自动复位命令时序图

注：参数E00.14、E00.15可以设定故障自动复位功能使能后的不可复位的故障。

表4-20 故障自动复位相关参数

参数	参数名称
E00.10	故障自动复位功能
E00.11	故障复位次数重置时间
E00.12	故障复位间隔时间
E00.13	故障复位次数
E00.14	不可复位异常码1
E00.15	不可复位异常码2

设定自动重启
自动重启是在故障自动复位后生效的，如果在出现故障后电机可能会长时间旋转，您还必须另外启用“转速追踪”功能，参见4.7.2。

表4-21 自动重启设置参数

参数	参数名称	描述
E00.23	自动复位后重启功能	使能自动重启功能
E00.24	允许重启的异常来源	0：指定异常码允许重启
		1：指定异常码不允许重启
E00.25	指定的异常码1	设置特殊处理的故障
E00.26	指定的异常码2	设置特殊处理的故障

4.7.4PID工艺控制器

概述

工艺控制器用来控制过程数据，如压力、温度、液位或流量。

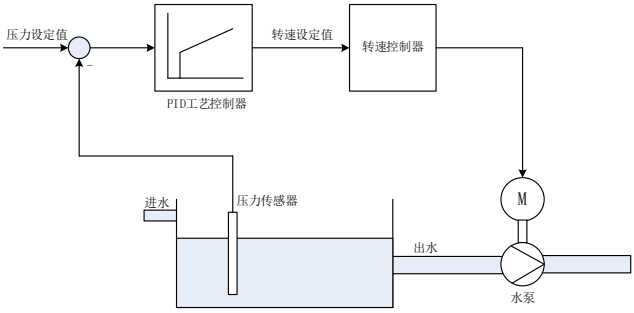
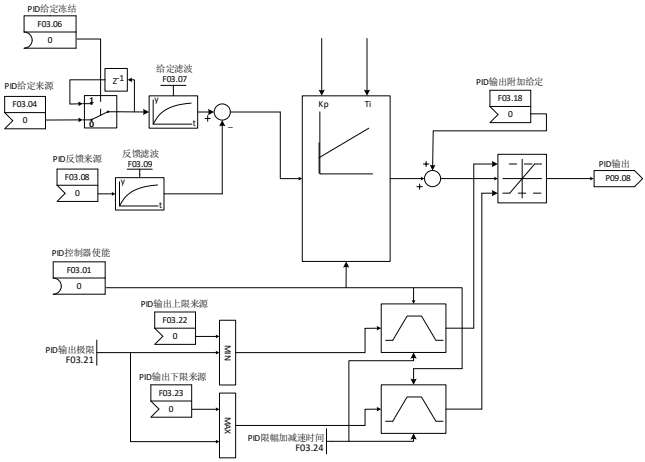


图4-26 示例：工艺控制器用作压力控制器

设置工艺控制器

工艺控制器的简化示意图

工艺控制器设计为 PID 控制器（带比例元件、积分元件和差分元件的控制器）。



设置工艺控制器

参数	参数名称
F03.00	PID功能有效信号
F03.01	PID运算使能信号
F03.04	PID给定源来源
F03.05	PID数值给定
F03.07	PID给定滤波时间
F03.08	PID反馈源来源
F03.09	PID反馈滤波时间
F03.11	比例增益KP
F03.12	比例增益系数
F03.13	积分时间Ti
F03.14	积分时间系数
F03.15	微分时间Td1
F03.16	微分时间系数

高级参数设置

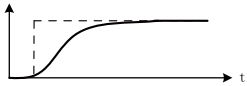
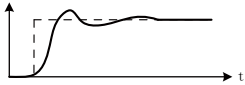
参数	参数名称
F03.06	PID给定冻结使能
F03.10	PID偏差附加给定
F03.17	PID输出积分初值
F03.18	PID输出附加给定
F03.20	PID积分分量强制值
F03.21	PID输出极限
F03.22	PID输出上限来源
F03.23	PID输出下限来源
F03.24	PID输出限幅上升/下降时间
F03.25	PID偏差死区使能
F03.26	PID偏差死区范围
F03.27	PID反馈丢失检测值
F03.28	PID反馈丢失检测时间

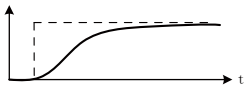
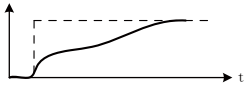
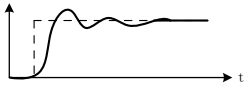
优化控制器

步骤

1.PID过程控制器使能，运算使能。

2. 预先给定一个设定值阶跃，观察相应的实际值,如使用 Eoperation 的跟踪功能，所要控制的过程的反应越迟缓，您需要对控制器性能进行观察的时间就越长。比如进行温度控制时，您必须要等待数分钟，直到可以辨别出控制器的性能为止。

	最理想的控制性能，没有超调。 实际值接近设定值，无明显超调。
	最理想的控制性能，上升时间短， 受到干扰时调节时间短。 实际值接近设定值并出现轻微的超调，最大为设定值阶跃的 10%。

	实际值缓慢接近设定值。 . 提高比例元件 K_P，降低积分元件 T_I。
	实际值缓慢接近设定值，但有轻微超调。 · 提高比例元件 K_P，降低积分元件 T_d（差分时间）。
	实际值快速接近设定值，但超调量很大。 · 降低比例元件 K_P，提高积分元件 T_I。

4.7.5自由功能块

概述

使用自由功能块可以在驱动器内建立可配置的信号互联。

驱动器主要提供以下自由功能块：

◆逻辑运算模块:AND(与)、OR(或)、NOT(非)

◆算数运算模块:ADD(加法器)、SUB(减法器)、AVA(绝对值)、NCM(比较器)

◆时间继电器RLY

驱动器中自由功能块的数量有一定限制。每个功能块只能用一次。驱动器有3个加法器。示例:如果已经配置了三个加法器,则无法再添加更多的加法器。

自由功能块列表

逻辑与模块

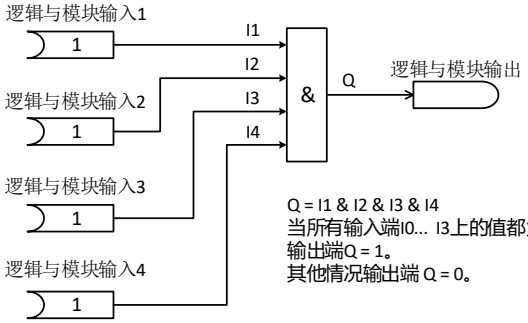


表4-22 逻辑与模块设置参数

	AND A	AND B	AND C	AND D
I1	F00.00	F00.05	F00.10	F00.15
I2	F00.01	F00.06	F00.11	F00.16
I3	F00.02	F00.07	F00.12	F00.17
I4	F00.03	F00.08	F00.13	F00.18
Q	P03.00	P03.01	P03.02	P03.03

逻辑或模块

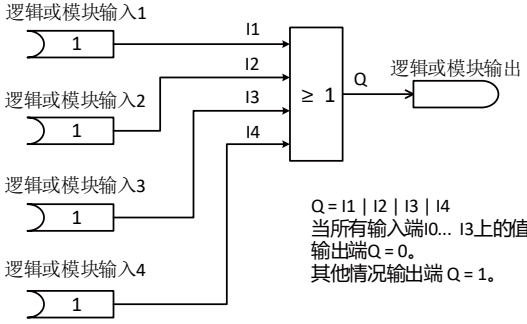


表4-23 逻辑或模块设置参数

	OR A	OR B	OR C	OR D
I1	F00.36	F00.41	F00.46	F00.51
I2	F00.37	F00.42	F00.47	F00.52
I3	F00.38	F00.43	F00.48	F00.53
I4	F00.39	F00.44	F00.49	F00.54
Q	P03.12	P03.13	P03.14	P03.15

逻辑与模块

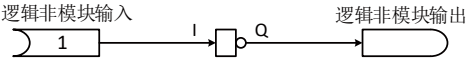
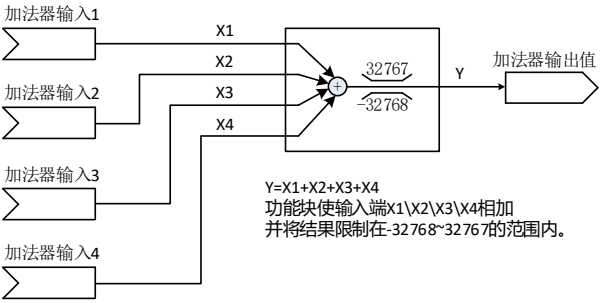


表4-24 逻辑非模块设置参数

	NOT A	NOT B	NOT C	NOT D	NOT E	NOT F	NOT G	NOT H
I	F00.20	F00.22	F00.24	F00.26	F00.28	F00.30	F00.32	F00.34
Q	P03.04	P03.05	P03.06	P03.07	P03.08	P03.09	P03.10	P03.11

算术运算模块-加法器

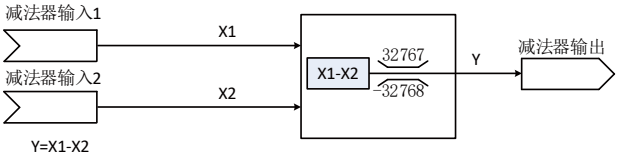


Y=X1+X2+X3+X4
功能块使输入端X1\X2\X3\X4相加
并将结果限制在-32768~32767的范围内。

表4-25 加法器设置参数

	ADD A	ADD B	ADD C
X1	F01.00	F01.05	F01.10
X2	F01.01	F01.06	F01.11
X3	F01.02	F01.07	F01.12
X4	F01.03	F01.08	F01.13
Y	P08.00	P08.01	P08.02

算术运算模块-减法器



Y=X1-X2
功能块使输入X1减去X2并将结果限制在- 32768 ~32767的范围内。

表4-26 加法器设置参数

	SUB A	SUB B
X1	F01.15	F01.18
X2	F01.16	F01.19
Y	P08.04	P08.05

算术运算模块-比较器

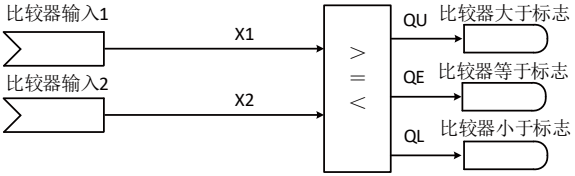


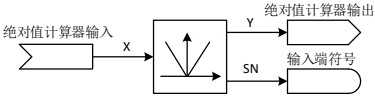
表4-27 功能表

输入端比较	QU	QE	QL
X1＞X2	1	0	0
X1＝X2	0	1	0
X1＜X2	0	0	1

表4-28 比较器设置参数

	NCM A	NCM B
X1	F01.41	F01.44
X2	F01.42	F01.45
QU	P03.24	P03.27
QE	P03.25	P03.28
QL	P03.26	P03.29

算术运算模块-绝对值计算器



Y = abs(X)
该功能块用于计算输入端 X 上的值的绝对值。
当 X < 0 时，变频器会设置 SN = 1。

表4-29 绝对值计算器设置参数

	AVA A	AVA B
X	F01.37	F01.39
Y	P08.24	P08.25
SN	P03.32	P03.33

时间继电器

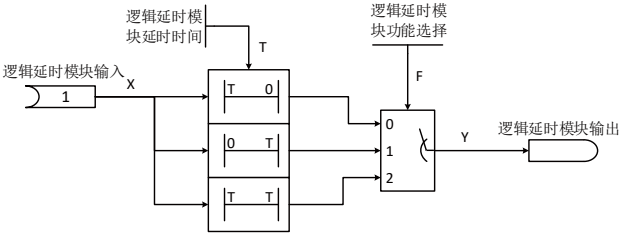


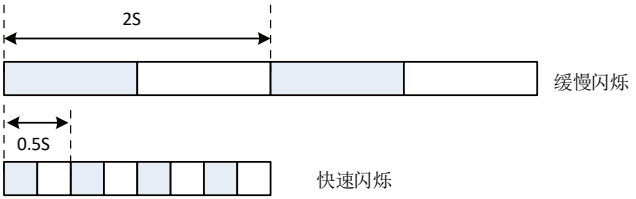
表4-30 时间继电器设置参数

	RLY A	RLY B	RLY C	RLY D
X	F00.76	F00.79	F00.82	F00.85
F	F00.77	F00.80	F00.83	F00.86
T	F00.78	F00.81	F00.84	F00.87
Y	P03.20	P03.21	P03.22	P03.23

5 异常与系统信息

5.1 LED指示灯显示说明

1）LED显示运行状态：

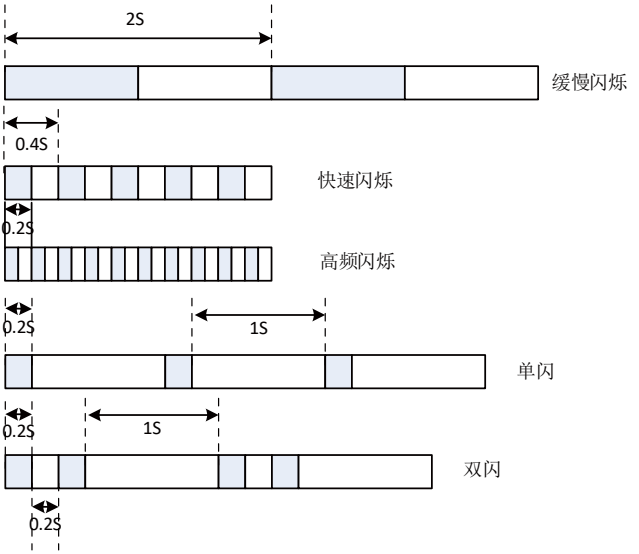


LED点亮状态说明	
1	亮
2	灭
3	缓慢闪烁（2S周期）
4	快速闪烁（0.5S周期）

5.2 LED显示运行状态

	LED	状态说明
状态机状态	R/E（绿红）	
	绿色，缓慢闪烁	开机准备、预驱动、运行准备
	绿色，快速闪烁	开机封锁
	绿色，常亮	运行
	红色，常亮	故障
	橙色，常亮	故障停机
升级状态	橙色，缓慢闪烁	升级准备
	橙色绿色，交替闪烁	正在升级
	橙色，快速闪烁	升级成功
	红色，快速闪烁	升级失败

2）LED显示运行状态：



LED点亮状态说明	
1	亮
2	灭
3	缓慢闪烁（2S周期）
4	快速闪烁（0.4S周期）
5	高频闪烁（0.2S周期）
6	单闪（1.2S周期）
7	双闪（1.6S周期）

5.3LED显示通信状态

5.3.1EtherCAT通信状态显示

LED	状态说明
COMM（绿红）	
灭灯	初始化和其他操作
绿色，快速闪烁	EC预操作
绿色，单闪	EC安全操作
绿色，常亮	EC处于操作状态
红色，单闪	EC同步错误
红色，双闪	EC SM看门狗超时
红色，常亮	EC其他错误

5.3.2Modbus通信状态

LED	状态说明
COMM（绿红）	
绿灯，高频闪烁	连续收发信号

5.4故障和警告列表

序号	故障名称	故障子码	子码含义	解决对策
1	过流	1	母线过流	1.排除动力线破损问题
				2.检查接线是否短路
				3.增加加减速时间
				4. VF控制下减小VF转矩提升量
				5.请确认电机停止稳定后再启动
		3	UVW相过流	6.减小或取消负载
		4	对地短路时过流	7.矢量控制下请确认是否进行过正确的参数辨识操作
		5	对地短路时过压	8.联系售后或厂家，寻求技术支持
2	过压	1	快速检测中母线电压过压	1.请检查输入电源是否在合理范围
				2.请增长加减速时间
				3.加装制动电阻或制动单元
				4.联系售后或厂家，寻求技术支持
3	欠压	1	母线欠压	1.请检查输入电源是否在合理范围
				2.请确认电网是否瞬间断电
				3.联系售后或厂家，寻求技术支持
5	驱动器过载	1	驱动器过载	1.请确认驱动器选型是否合适，或更换更大容量的驱动器
				2. VF控制下减小VF转矩提升量
				3.矢量控制下减小转矩限幅值
				4.请确认负载是否过重，或者抱闸等锁死情况
				5.矢量控制时请确认是否进行正确的参数自学习操作
				6.带编码器应用下，请确认编码器方向及参数设定是否正确
				7.联系售后或厂家，寻求技术支持

序号	故障名称	故障子码	子码含义	解决对策
6	电机过载	1	马达过载	1.请确认电机负载是否过大 2.矢量控制时请确认是否进行过电机参数自学习 3.带编码器应用下，请确认编码器方向及参数设定是否正确 4.请确认负载是否过重，或者抱闸等锁死情况 5.请确认是否正确设定电机铭牌参数 6.联系售后或厂家，寻求技术支持
7	输入缺相	1	输入缺相检测	1.请检查动力输入电缆是否接触良好 2.联系售后或厂家，寻求技术支持
8	输出缺相	1	U相输出缺相	1.请检查对应的输出电缆是否接线正确及接触良好
		2	V相输出缺相	2.请确认电机是否运行平稳
		3	W相输出缺相	3.联系售后或厂家，寻求技术支持
		4	FVC控制输出缺相	
		5	三相输出严重不平衡	
		6	定子电阻辨识输出缺相	
		7	SVC控制输出缺相	
9	驱动器过热	1	驱动器过热	1.请确认环境温度是否过高 2.联系售后或厂家，寻求技术支持
11	电流零飘检测错误	1	U相零漂偏大	1. PM异常，联系售后或厂家，寻求技术支持
		2	V相零漂偏大	
13	调谐失败	1	动态调谐异常	1.请确认电机铭牌参数设置是否正确
		2	静态调谐失败	2.联系售后或厂家，寻求技术支持
15	矢量失速报警	1	速度在外力作用下被反向	1.请确认电机铭牌参数设置是否正确 2.请确认是否做过电机参数自学习操作 3.请检查和失速相关的参数设置是否合理
		2	速度偏差过大	4.联系售后或厂家，寻求技术支持
21	机型设置错误	1	机型超过下限	1.请确认驱动器机型是否和标签一致
		2	机型超过上限	2.联系售后或厂家，寻求技术支持
33	驱动器预过载	1	驱动器过载预警告	1.请确认是否开启驱动器预过载功能 2.联系售后或厂家，寻求技术支持
34	电机预过载	1	电机过载预警告	1.请确认是否开启驱动器预过载功能 2.联系售后或厂家，寻求技术支持
35	通信异常	1	后台启动时异常断开	1.检查驱动器的相关通信线缆是否连接异常
		2	操作面板启动时异常断开	2.检查通信超时参数设置是否合理
		3	Modbus通信故障	3.联系售后或厂家，寻求技术支持
		5	EtherCAT通信故障	

序号	故障名称	故障子码	子码含义	解决对策
37	电机速度超限	1	电机转速超出最大转速限制	1.请检查和电机超速相关的参数设置是否合理 2.联系售后或厂家，寻求技术支持
38	电机速度偏差过大	1	电机转速与给定转速偏差过大	1.请检查和电机速度偏差过大相关的参数设置是否合理 2.联系售后或厂家，寻求技术支持
40	PID反馈丢失	1	PID反馈采样值丢失	1.检查PID反馈输入的信号 2.联系售后或厂家，寻求技术支持
41	外部故障	1	产生外部故障1	1.检查外部输入信号
43	预驱动失败	1	运行命令产生时没有检	1.检查外部供电电压是否异常 2.联系售后或厂家，寻求技术支持
47	控制板温度过温	1	控制板温度过温	1.请确认环境温度是否过高 2.联系售后或厂家，寻求技术支持
49	AI断线	1	AI0 4~20mA输入断线	1.检查布线是否中断 2.检查信号的电平
		2	AI1 4~20mA输入断线	3.联系售后或厂家，寻求技术支持
51	Flash故障	1	Flash不能访问	1.重新上电
		2	功能码值不在上下限范围	2.检查修改功能码的频率是否太高
		3	Flash写入后回读错误	3.联系售后或厂家，寻求技术支持
		4	功能码修改次数超限	
		5	字库下载错误	请重新下载正确版本的字库

5.5 电动机的常见故障与处理方法

5.5.1 电动机的常见故障与处理方法见下表

故障现象	造成故障的可能原因	处理方法
（1）不能起动	a. 负载或传动机械有故障	把电动机和负载分开，如电动机能正常起动，应检查被拖动机械，消除障碍
	b. 变频器参数设置不当	检查变频器参数，进行调整（变频电机）
(2)电动机起动后转速低于额定转速	a. 变频器的输出频率与输出电压设定不当	按使用要求重新设定
	b. 负载过重	检查负载传动装置是否正常
(3)电动机有异常噪声或振动过大	a. 机械摩擦（包括定转子相擦）	检查转动部分与静止部分间隙，找出相擦原因，进行校正
	b. 缺相运行	断电，再合闸，如不能起动，则可能有一相断电，检查电源或电动机并加以修复
	c. 轴承缺油或损坏	清洗轴承，加新油。或更换新轴承
	d. 修理后转子平衡被破坏	重新校动平衡
	e. 轴伸弯曲、变形	校直，必要时须更换转轴
	f. 联轴器俩连接松动	查清松动处，把螺栓拧紧
	g. 安装基础不平衡或有缺陷	检查基础固定情况，加以纠正
(4)电动机温升过高	a. 过载	用电磁式电流表测量定子电流或检查变频器面板上的电流显示值，发现过载时，应减轻负载
	b. 缺相运行	检查电动机或变频器接线，并加以修复
	c. 定、转子相擦	检查轴承装配有无松动，定子和转子装配有无不良情况，加以修复
	d. 通风不畅	检查风机和风叶有否损坏，风道有否阻塞。风机或风叶损坏应予以修复或更换。风道阻塞应移开妨碍通风的物件，清除风道污垢、灰尘及杂物，使空气流通
	e. 变频器的V、f参数设置不当，使电动机低速轻载时出现过激励，电流大于额定值	调整V/f的参数设置（变频电机）
	f. 利用变频器的直流制动功能对电机进行制动时，制动电流太大	调整直流制动电流的设置，根据制动频繁程度，一般设置在额定电流的100%-150%。
(6)轴承过热	a. 轴承损坏	更换轴承
	b. 轴承润滑脂过多、过少或有杂质	调整或更换润滑脂
	c. 轴承与轴、轴承与端盖配合过松或过紧	修整到合适的配合
	d. 电动机两侧端盖没有装配好（不平行）	将两侧端盖或轴承盖止口装平，旋转螺栓
	e. 轴伸端油封安装不良	调整到合适的安装状态
	f. 皮带安装过松或过紧，或联轴器装配不良	调整到合适的安装状态调整皮带松紧或联轴器的安装
(7)电动机外壳带电	a. 接地不良	检查接地螺栓，接地线同机壳接触是否紧密
	b. 绕组受潮，绝缘电阻过低	绕组干燥处理
	c. 绝缘损坏，定子线圈碰铁芯	予以修复
	d. 引出线绝缘磨破	破损处用绝缘材料包扎

5.5.2 电动机维护

◆定期检修电机。
◆保持电机清洁，空气流通。
◆检查轴伸的密封圈，如有必要应及时更换。
◆检查安装连接状况和安装螺钉。
◆对轴承要予以特别重视，安装、拆换轴承要加热或使用特殊工具，关于拆换轴承的具体细节可以从本公司获得。
◆通过监听异常噪声，振动测量，温度检测，监控用油量或SPM轴承测振元件等来检查轴承运行情况。
◆如有异常发生，应立即停机，检查原因并及时排除。
◆电机储存时应保存在室内，要求干燥，防震，防尘的环境；无保护层的电机表面(轴伸端部和法兰)应该采取防锈措施。

6 功能码

6.1 A组-系统状态与外设

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
A00组:状态监视与设置						
A00.00	当前状态机	0~30	0	0	30	0x2000
A00.01	目标频率	-327.68~327.67Hz	0	-327.68	327.67	0x2001
A00.02	给定频率	-327.68~327.67Hz	0	-327.68	327.67	0x2002
A00.03	马达频率	-327.68~327.67Hz	0	-327.68	327.67	0x2003
A00.04	目标速度	-32768~32767rpm	0	-32768	32767	0x2004
A00.05	给定速度	-32768~32767rpm	0	-32768	32767	0x2005
A00.06	马达转速	-32768~32767rpm	0	-32768	32767	0x2006
A00.07	输出电压	0~1000V	0	0	1000	0x2007
A00.08	输出电流	0~655.35A	0	0	655.35	0x2008
A00.09	输出功率	-32768~32767	0	-327.68	327.67	0x2009
A00.10	给定转矩	-300.0~300.0%	0	-300	300	0x200A
A00.11	输出转矩	-300.0~300.0%	0	-300	300	0x200B
A00.14	直流母线电压	0~1000.0V	0	0	1000	0x200E
A00.15	散热器温度	-40~150°	0	-40	150	0x200F
A00.16	DI状态	0~65535	0	0	65535	0x2010
A00.41	开机显示选择1	0:当前状态机 1:目标频率 2:给定频率 3:输出频率 4:目标速度 5:给定速度 6:马达转速 7:输出电压 8:输出电流 9:输出功率 10:给定转矩 11:输出转矩 12:系统预约 13:系统预约 14:直流母线电压 15:散热器温度 16:DI状态	1	0	17	0x2029
A00.42	开机显示选择2	同上	3	0	17	0x202A
A00.43	开机显示选择3	同上	8	0	17	0x202B
A00.44	开机显示选择4	同上	11	0	17	0x202C
A00.45	开机显示选择5	同上	14	0	17	0x202D
A00.46	开机显示选择6	同上	15	0	17	0x202E
A01组:故障和警告						
A01.00	当前故障码1	0~51	0	0	51	0x2100
A01.01	当前故障码1子码	0~65535	0	0	65535	0x2101
A01.04	当前警告码1	0~51	0	0	51	0x2104
A01.05	当前警告码1子码	0~65535	0	0	65535	0x2105
A02组:变频器信息与设置						
A02.00	功能软件版本号	0.00~655.35	0	0	655.35	0x2200
A02.01	通信卡类型	0:无 1:Modbus 5:EtherCAT	0	0	7	0x2201
A02.02	性能软件版本号	0~65535	0	0	655.35	0x2202
A02.04	PM功率单元额定功率	0.00~655.35	0	0	655.35	0x2204
A02.05	PM功率单元额定电压	0~65535	0	0	65535	0x2205
A02.06	PM功率单元额定电流	0.00~655.35	0	0	655.35	0x2206
A02.07	功能码版本号	0.00~655.35	0	0	655.35	0x2207
A02.08	版本发布时间	0x0~0xFFFF	0	0	65535	0x2208

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
A03组:PM功率单元保护与设置						
A03.08	载波频率设定	0:1KHz 1:2KHz 2:4KHz 3:6KHz 4:8KHz	2	0	4	0x2308
A03.13	DPWM切换频率	1.00Hz ~ 60.0Hz	8	1	60	0x230D
A03.16	死区补偿使能	0:禁止 1:死区补偿方法1 2:死区补偿方法2	1	0	2	0x2310
A03.19	输入缺相检测	0:禁止 1:允许	0	0	1	0x2313
A03.20	制动电阻动作点	600.0~800.OV	700	600	800	0x2314
A03.21	软件欠压点	60% ~ 150%	100	60	150	0x2315
A04组:系统应用与环境设定						
A04.00	参数复位模式	0:无效 1:机型参数，马达参数，故障记录不复位 2:马达参数，故障记录不复位 3:全部参数恢复出厂 4:清除记录参数	0	0	4	0x2400
A04.01	参数复位	0:取消 1:确认	0	0	1	0x2401
A04.02	参数访问级别	0:标准参数 1:扩展参数 2:专家参数 3:厂家参数	0	0	3	0x2402
A04.03	厂家密码	0~65535	0	0	65535	0x2403
A04.16	电机类型选择	0:MP 1:MH	0	0	1	0x2410
A04.14	驱动器驱动模式选择	0:普通通信模式 1:CoE_VL模式	0	0	65535	0x240E
A04.16	电机类型选择	0:MP 1:MH	0	0	1	0x2410
A05组:数字量输入						
A05.00	DI物理状态值	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2500
A05.02	DI处理后状态值	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2502
A05.04	DI强制选择	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2504
A05.06	DI强制数据	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2506
A05.08	DI0开通延时	0.0~6553.5S	0	0	6553.5	0x2508
A05.09	DI0关断延时	0.0~6553.5S	0	0	6553.5	0x2509
A05.10	DI1开通延时	0.0~6553.5S	0	0	6553.5	0x250A
A05.11	DI1关断延时	0.0~6553.5S	0	0	6553.5	0x250B
A05.12	DI2开通延时	0.0~6553.5S	0	0	6553.5	0x250C
A05.13	DI2关断延时	0.0~6553.5S	0	0	6553.5	0x250D
A05.14	DI3开通延时	0.0~6553.5S	0	0	6553.5	0x250E
A05.15	DI3关断延时	0.0~6553.5S	0	0	6553.5	0x250F

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
A07组:模拟量输入						
A07.00	AI输入值	0.000 ~ 10.000	0	0	10	0x2700
A07.01	AI输入比例	-600.0% ~ 600.0%	0	-600	600	0x2701
A07.02	电位器输入值	0.000 ~ 3.000	0.004	0	3	0x2702
A07.03	电位器输入比例	-600.0% ~ 600.0%	1	-600	600	0x2703
A07.04	AI类型	0:预留 1:0~10V	1	0	1	0x2704
A07.06	AI曲线最小输入值	0.000 ~ 10.000	0	0	10	0x2706
A07.07	AI曲线最小输入比例	-600.0% ~ 600.0%	0	-600	600	0x2707
A07.08	AI曲线最大输入值	0.000 ~ 10.000	10	0	10	0x2708
A07.09	AI曲线最大输入比例	-600.0% ~ 600.0%	100	-600	600	0x2709
A07.10	电位器最小输入值	0.000 ~ 3.000	0.1	0	3	0x270A
A07.11	电位器最小输入比例	-600.0% ~ 600.0%	0	-600	600	0x270B
A07.12	电位器最大输入值	0.000 ~ 3.000	2.9	0	3	0x270C
A07.13	电位器最大输入比例	-600.0% ~ 600.0%	100	-600	600	0x270D
A07.14	AI低于最小输入设定选择	00~11	0	0	11	0x270E
A07.15	AI滤波时间	0~10000ms	10	0	10000	0x270F
A07.16	电位器滤波时间	0~10000ms	10	0	10000	0x2710

6.2 B组-控制参数组

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
B00组:系统控制命令设置						
B00.00	启停控制命令来源	0:端子控制模块 1:自定义控制模块	0	0	1	0x3000
B00.01	自定义OFF1来源	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x3001
B00.02	自定义OFF2来源1	0:有效 1:无效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x3002
B00.03	自定义OFF3来源1	0:有效 1:无效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x3003
B00.04	自定义运行允许来源	0:运行不允许 1:运行允许 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x3004
B00.05	自定义故障复位来源1	0:无效 1:有效 2~5:DI0~DI3 6~10:预留其它:二进制互联参数	0	0	10	0x3005
B00.06	自定义速度命令取反来源	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x3006
B00.07	自定义JOG1来源	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x3007
B00.08	自定义JOG2来源	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x3008
B00.11	OFF3来源2	0:有效 1:无效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x300B
B00.13	故障复位来源2	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x300D
B00.15	斜坡函数发生器(RFG)禁止来源	0:RFG禁止有效 1:RFG禁止无效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x300F

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
B00组:系统控制命令设置						
B00.16	斜坡函数发生器(RFG)暂停来源	0:RFG暂停有效 1:RFG暂停无效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x3010
B00.17	斜坡函数发生器(RFG)给定置0来源	0:RFG给定置0有效 1:RFG给定置0无效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x3011
B00.21	辨识请求	0:无 1:异步机简易静态辨识 2:异步机静态完整辨识 3:异步机动态完整辨识异步机静态完整辨识 3:异步机动态完整辨识	0	0	3	0x3015
B00.23	OFF1停机方式	0:自由停机 1:减速停机	1	0	1	0x3017
B00.24	OFF3停机时间	0.0s ~ 1000.0s	10	0	1000	0x3018
B01组:启停控制模块						
B01.01	启停控制命令方式	0:无效 1:IN1启动 2:IN1启动，IN2方向 3:IN1正向启动,IN2反向启动 4:IN1P启动，IN2停止 5:IN1P启动，IN2停止，IN3方向 6:IN1P正向启动，IN2P反向启动，IN3停止	3	0	6	0x3101
B01.03	启停命令输入IN1	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	2	0	10	0x3103
B01.04	启停命令输入IN2	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	3	0	10	0x3104
B01.05	启停命令输入IN3	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	4	0	10	0x3105
B01.11	JOG1来源	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x310B
B01.12	JOG2来源	0:无效 1:保留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x310C

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
B02组:命令源设置						
B02.00	速度控制主设定选择	0:0 1:多段设定值1 2:AI 3:内部电位器 4~5:预留 6:多段值给定 7:电动电位器 8~9:预留 10:Modbus设定标幺值1 其它:模拟量互联参数	1	0	10	0x3200
B02.01	速度控制辅设定选择	同上	0	0	10	0x3201
B02.02	附加速度给定	同上	0	0	10	0x3202

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
B03组:其他命令源设定方式						
B03.00	JOG1给定设置	0:0 1:多段设定值1 2:AI 3:内部电位器 4~5:预留 6:多段值给定 7:电动电位器 8~9:预留 10:Modbus设定标幺值1 其它:模拟量互联参数	1	0	10	0x3300
B03.01	JOG2给定设置	同上	0	0	10	0x3301
B03.02	JOG加速时间	0.0~1000.0S	10	0	1000	0x3302
B03.03	JOG减速时间	0.0~1000.0S	10	0	1000	0x3303
B03.04	电动电位器功能	0:禁止 1:开启	1	0	1	0x3304
B03.05	电动电位器初始值	-600.0~600.0%	0	-600	600	0x3305
B03.06	电动电位器斜坡时间	0.0~1000.0S	10	0	1000	0x3306
B03.07	电动电位器最小值	-600.0~600.0%	0	-600	600	0x3307
B03.08	电动电位器最大值	-600.0~600.0%	100	-600	600	0x3308
B03.09	电动电位器增加来源选择	0:00 1:01 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x3309
B03.10	电动电位器下降来源选择	0:00 1:01 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x330A
B03.11	多段给定值	-600.0~600.0%	0	-600	600	0x330B
B03.12	多段给定值选择1	0:00 1:01 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x330C
B03.13	多段给定值选择2	同上	0	0	10	0x330D
B03.14	多段给定值选择3	同上	0	0	10	0x330E
B03.16	多段设定值1	-600.0~600.0%	10	-600	600	0x3310
B03.17	多段设定值2	-600.0~600.0%	20	-600	600	0x3311
B03.18	多段设定值3	-600.0~600.0%	30	-600	600	0x3312
B03.19	多段设定值4	-600.0~600.0%	-10	-600	600	0x3313
B03.20	多段设定值5	-600.0~600.0%	-20	-600	600	0x3314
B03.21	多段设定值6	-600.0~600.0%	-30	-600	600	0x3315
B03.22	多段设定值7	-600.0~600.0%	0	-600	600	0x3316
B03.23	多段设定值8	-600.0~600.0%	0	-600	600	0x3317

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
B04组:斜坡函数发生器						
B04.00	RFG斜坡时间选择1	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x3400
B04.01	RFG斜坡时间选择2	同上	0	0	10	0x3401
B04.02	斜坡1加速时间	0.0~1000.0S	5	0	1000	0x3402
B04.03	斜坡1减速时间	0.0~1000.0S	5	0	1000	0x3403
B04.04	斜坡2加速时间	0.0~1000.0S	5	0	1000	0x3404
B04.05	斜坡2减速时间	0.0~1000.0S	5	0	1000	0x3405
B04.06	斜坡3加速时间	0.0~1000.0S	5	0	1000	0x3406
B04.07	斜坡3减速时间	0.0~1000.0S	5	0	1000	0x3407
B04.08	斜坡4加速时间	0.0~1000.0S	5	0	1000	0x3408
B04.09	斜坡4减速时间	0.0~1000.0S	5	0	1000	0x3409
B04.10	S曲线1开始时间	0.00~20.00S	0	0	20	0x340A
B04.11	S曲线1结束时间	0.00~20.00S	0	0	20	0x340B
B04.12	S曲线2开始时间	0.00~20.00S	0	0	20	0x340C
B04.13	S曲线2结束时间	0.00~20.00S	0	0	20	0x340D
B04.14	S曲线3开始时间	0.00~20.00S	0	0	20	0x340E
B04.15	S曲线3结束时间	0.00~20.00S	0	0	20	0x340F
B04.16	S曲线4开始时间	0.00~20.00S	0	0	20	0x3410
B04.17	S曲线4结束时间	0.00~20.00S	0	0	20	0x3411
B05组:马达控制选择						
B05.00	马达控制方式	0:VF 1:SVC	0	0	1	0x3500
B05.02	正速度允许	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	1	0	10	0x3502
B05.03	负速度允许	同上	1	0	10	0x3503
B05.04	马达启动方式	0:直接启动 1:预励磁启动 2:转速追踪启动 3:直流制动启动	0	0	3	0x3504
B05.06	预励磁时间设定	0.00~100.00S	0	0	100	0x3506
B05.08	预励磁电流数字设定	10.0% ~ 200.0% 100.0%相对马达额定电流	100	10	200	0x3508
B05.09	直流制动电流	0.0% ~ 100.0% 100.0%对应马达额定电流	50	0	100	0x3509
B05.10	启动时直流制动时间	0.00s~100.00s	0	0	100	0x350A
B05.11	停机时直流制动时间	0.00s~100.00s	0	0	100	0x350B
B05.12	停机直流制动起始速度	0 ~ 3000rpm	0	0	3000	0x350C
B05.13	转速追踪模式	0:转速追踪关闭 1:从停机频率开始搜索 2:从额定频率开始搜索 3:从最大频率开始搜索	0	0	3	0x350D
B05.14	转速追踪速度搜索时间	0.0~120.0S	25	0	120	0x350E
B05.15	转速追踪电流百分比	0~100%	50	0	100	0x350F

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
B05组:马达控制选择						
B05.16	转速追踪最小频率限制	0.00~50.00Hz	2	0	50	0x3510
B05.17	转速追踪切换等待时间	0~60000ms	250	0	60000	0x3511
B05.30	零速停机延迟时间	0.00~100.00S	0	0	100	0x351E
B05.32	OFF1停机方式选择	0:自由停机 1:减速停机	1	0	1	0x3520
B05.33	OFF3停机时间	0.0s ~ 1000.0s	10	0	1000	0x3521
B06组:马达控制限制及保护						
B06.00	跳跃频率1下限	0.0%~300.0% 100.0%相对于马达额定频率	0	0	0	0x3600
B06.01	跳跃频率1上限	0.0%~300.0% 100.0%相对于马达额定频率	0	0	0	0x3601
B06.02	跳跃频率2下限	0.0%~300.0% 100.0%相对于马达额定频率	0	0	0	0x3602
B06.03	跳跃频率2上限	0.0%~300.0% 100.0%相对于马达额定频率	0	0	300	0x3603
B06.04	正向极限速度	0.0%~300.0% 100.0%相对于马达额定频率	100	0	300	0x3604
B06.05	反向极限速度	-300.0%~0% 100.0%相对于马达额定频率	-100	-300	0	0x3605
B06.12	矢量控制转矩限幅	0.0%~200.0%	180	0	200	0x360C
B06.13	抱闸打开前转矩限幅	0.0%~200.0%	180	0	200	0x360D
B06.25	马达过载软件保护选择	0:禁止 1:允许	1	0	1	0x3619
B06.26	马达过载软件保护增益	20~1000%	100	20	1000	0x361A
B06.28	过速度检测值	0.0% ~ 50.0% 100.0%相对马达额定转速	20	0	50	0x361C
B06.29	过速度检测时间	0.0S:不检测 0.1S ~ 60.0S	5	0	60	0x361D
B06.32	比较值到达检测值	0.0% ~ 300.0% 100.0%相对马达额定转速达额定转速	100	0	300	0x3620
B06.33	比较值到达检测滞后值	0.0% ~ B06.32 100.0%相对马达额定转速额定转速	3	0	100	0x3621
B06.34	比较值到达检测时间	0.0:不检测 0.1s ~ 300.0s	3	0	600	0x3622
B06.37	输出缺相检测	0:禁止 1:允许	1	0	1	0x3625
B06.59	失速检测时间1	0~5000ms	500	0	5000	0x363B
B06.60	失速检测时间2	0~5000ms	500	0	5000	0x363C
B06.61	矢量失速检测系数2	0~100%	20	0	100	0x363D
B06.62	SVC控制模式	0:控制模式1 1:控制模式2 2:控制模式3	0	0	2	0x363E
B06.64	矢量控制滑差补偿系数	50~200%	100	50	200	0x3640

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
B07组:VF控制						
B07.00	VF模式选择	0:VF曲线 1:VF分离	0	0	1	0x3700
B07.01	VF曲线选择	0:直线VF 1:多点VF 2:平方V/F 3: 1.5次V/F	0	0	3	0x3701
B07.02	多点VF曲线频率点1	0.0 ~ B07.04	2	0	20	0x3702
B07.03	多点VF曲线电压点1	0.0 ~ B07.05	20	0	152	0x3703
B07.04	多点VF曲线频率点2	B07.02 ~ B07.06	20	2	40	0x3704
B07.05	多点VF曲线电压点2	B07.03 ~ B07.07	152	20	304	0x3705
B07.06	多点VF曲线频率点3	B07.04~D00.04	40	20	50	0x3706
B07.07	多点VF曲线电压点3	B07.05 ~ D00.02	304	152	380	0x3707
B07.10	Imax控制使能	0:无效 1:有效	1	0	1	0x370A
B07.11	Imax控制调频增益	0 ~ 100	30	0	100	0x370B
B07.12	Imax抑制点	0 ~ 200	150	0	200	0x370C
B07.13	VF转矩提升方式	0:不使能 1:手动 2:自动	1	0	2	0x370D
B07.15	VF手动加速转矩提升	0% ~ 250%	1	0	50	0x370F
B07.16	VF转矩提升截止频率	0.00~100.00Hz	50	0	100	0x3710
B07.17	VF转差补偿系数	0.0% ~ 300.0%	0	0	300	0x3711
B07.20	VF振荡抑制模式	0:无效 1:有效	1	0	1	0x3714
B07.21	VF振荡抑制增益	0 ~ 500%	10	0	500	0x3715
B07.24	VF过励磁增益	0 ~ 200.0	0	0	200	0x3718
B07.28	Vdc_max控制开关	0:禁止 1:使能	0	0	1	0x371C
B07.29	Vdc_max电压裕量	115%~150%	125	115	150	0x371D
B07.34	Vdc_min控制开关	0:禁止 1:使能	0	0	1	0x3722
B07.35	Vdc_min 调压增益系数	65~100	85	65	100	0x3723
B08组:速度调节器						
B08.02	速度环Kp低速	0.0~100.0	10	0	100	0x3802
B08.03	速度环Ti低速	0.00~10.00ms	1	0	10	0x3803
B08.04	速度环Kp高速	0.0~100.0	10	0	100	0x3804
B08.05	速度环Ti高速	0.00~10.00ms	2	0	10	0x3805
B08.11	速度环切换低频频率	0.00~40.00Hz	5	0	40	0x380B
B08.12	速度环切换高频频率	0.00~40.00Hz	10	5	40	0x380C
B08.13	速度环切换高频修正系数	0.0~400.0%	100	0	400	0x380D
B08.26	估计速度环滤波时间	0~10000ms	35	0	10000	0x381A
B09组:电流调节器						
B09.04	电流环比例系数	1%~1000%	100	1	1000	0x3904
B09.05	电流环积分系数	1%~1000%	100	1	1000	0x3905
B11组:马达模型及其它						
B11.51	监控通道1	0~65535	207	0	65535	0x3B33
B11.52	监控通道2	0~65535	209	0	65535	0x3B34
B11.53	监控通道3	0~65535	210	0	65535	0x3B35
B11.54	监控通道4	0~65535	211	0	65535	0x3B36
B11.56	电动频率上限	0~65535	1200	0	65535	0x3B38
B11.57	发电频率上限	0~65535	800	0	65535	0x3B39
B11.75	重载限速使能	0~65535	0	0	65535	0x3B4B
B11.78	预留	0~65535	0	0	65535	0x3B4E

6.3 C组-通信参数组

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
C00组:现场总线适配器A						
C00.00	总线适配器配套总线类型	0:无 1:Modbus 5:EtherCAT	0	0	7	0x4000
C00.01	通讯故障后的数据处理方式	0:数据保持 1:数据清零(预留)	0	0	1	0x4001
C00.02	PZD输出1	0:00 其他:模拟量互联参数	0	0	0	0x4002
C00.03	PZD输出2	0:00 其他:模拟量互联参数	0	0	0	0x4003
C00.04	PZD输出3	0:00 其他:模拟量互联参数	0	0	0	0x4004
C00.05	PZD输出4	0:00 其他:模拟量互联参数	0	0	0	0x4005
C00.06	PZD输出5	0:00 其他:模拟量互联参数	0	0	0	0x4006
C00.07	PZD输出6	0:00 其他:模拟量互联参数	0	0	0	0x4007
C00.08	PZD输出7	0:00 其他:模拟量互联参数	0	0	0	0x4008
C00.09	PZD输出8	0:00 其他:模拟量互联参数	0	0	0	0x4009
C00.10	PZD输出9	0:00 其他:模拟量互联参数	0	0	0	0x400A
C00.11	PZD输出10	0:00 其他:模拟量互联参数	0	0	0	0x400B
C00.12	PZD输出11	0:00 其他:模拟量互联参数	0	0	0	0x400C
C00.13	PZD输出12	0:00 其他:模拟量互联参数	0	0	0	0x400D
C00.14	PZD输出13	0:00 其他:模拟量互联参数	0	0	0	0x400E
C00.15	PZD输出14	0:00 其他:模拟量互联参数	0	0	0	0x400F
C00.16	PZD输出15	0:00 其他:模拟量互联参数	0	0	0	0x4010
C00.17	PZD输出16	0:00 其他:模拟量互联参数	0	0	0	0x4011
C00.18	PZD输出1通讯基值	0~65535	0	0	65535	0x4012
C00.19	PZD输出2通讯基值	0~65535	0	0	65535	0x4013
C00.20	PZD输出3通讯基值	0~65535	0	0	65535	0x4014
C00.21	PZD输出4通讯基值	0~65535	0	0	65535	0x4015
C00.22	PZD输出5通讯基值	0~65535	0	0	65535	0x4016
C00.23	PZD输出6通讯基值	0~65535	0	0	65535	0x4017
C00.24	PZD输出7通讯基值	0~65535	0	0	65535	0x4018
C00.25	PZD输出8通讯基值	0~65535	0	0	65535	0x4019
C00.26	PZD输出9通讯基值	0~65535	0	0	65535	0x401A
C00.27	PZD输出10通讯基值	0~65535	0	0	65535	0x401B
C00.28	PZD输出11通讯基值	0~65535	0	0	65535	0x401C
C00.29	PZD输出12通讯基值	0~65535	0	0	65535	0x401D
C00.30	PZD输出13通讯基值	0~65535	0	0	65535	0x401E
C00.31	PZD输出14通讯基值	0~65535	0	0	65535	0x401F
C00.32	PZD输出15通讯基值	0~65535	0	0	65535	0x4020
C00.33	PZD输出16通讯基值	0~65535	0	0	65535	0x4021
C00.34	PZD输入1通讯基值	0~65535	0	0	65535	0x4022
C00.35	PZD输入2通讯基值	0~65535	0	0	65535	0x4023
C00.36	PZD输入3通讯基值	0~65535	0	0	65535	0x4024

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
C00组:现场总线适配器A						
C00.37	PZD输入4通讯基值	0~65535	0	0	65535	0x4025
C00.38	PZD输入5通讯基值	0~65535	0	0	65535	0x4026
C00.39	PZD输入6通讯基值	0~65535	0	0	65535	0x4027
C00.40	PZD输入7通讯基值	0~65535	0	0	65535	0x4028
C00.41	PZD输入8通讯基值	0~65535	0	0	65535	0x4029
C00.42	PZD输入9通讯基值	0~65535	0	0	65535	0x402A
C00.43	PZD输入10通讯基值	0~65535	0	0	65535	0x402B
C00.44	PZD输入11通讯基值	0~65535	0	0	65535	0x402C
C00.45	PZD输入12通讯基值	0~65535	0	0	65535	0x402D
C00.46	PZD输入13通讯基值	0~65535	0	0	65535	0x402E
C00.47	PZD输入14通讯基值	0~65535	0	0	65535	0x402F
C00.48	PZD输入15通讯基值	0~65535	0	0	65535	0x4030
C00.49	PZD输入16通讯基值	0~65535	0	0	65535	0x4031
C00.50	PZD输出1数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4032
C00.51	PZD输出2数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4033
C00.52	PZD输出3数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4034
C00.53	PZD输出4数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4035
C00.54	PZD输出5数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4036
C00.55	PZD输出6数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4037
C00.56	PZD输出7数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4038
C00.57	PZD输出8数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4039
C00.58	PZD输出9数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x403A
C00.59	PZD输出10数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x403B
C00.60	PZD输出11数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x403C
C00.61	PZD输出12数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x403D
C00.62	PZD输出13数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x403E
C00.63	PZD输出14数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x403F
C00.64	PZD输出15数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4040
C00.65	PZD输出16数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4041
C00.66	PZD输入1数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4042
C00.67	PZD输入2数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4043
C00.68	PZD输入3数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4044
C00.69	PZD输入4数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4045
C00.70	PZD输入5数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4046
C00.71	PZD输入6数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4047
C00.72	PZD输入7数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4048
C00.73	PZD输入8数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4049
C00.74	PZD输入9数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x404A
C00.75	PZD输入10数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x404B
C00.76	PZD输入11数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x404C
C00.77	PZD输入12数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x404D
C00.78	PZD输入13数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x404E
C00.79	PZD输入14数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x404F
C00.80	PZD输入15数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4050
C00.81	PZD输入16数据显示	0~0xFFFF	0x0	0x0	0xFFFF	0x4051

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
C02组:Modbus通讯设置						
C02.00	Modbus波特率	0:2400bps 1:4800bps 2:9600bps 3:19200bps 4:38400bps 5:57600bps 6:115200bps	6	0	6	0x4200
C02.01	Modbus数据格式	0:偶校验（8-E-1） 1:奇校验（8-O-1） 2:无校验（8-N-2） 3:无校验（8-N-1）	3	0	3	0x4201
C02.02	Modbus本机地址	1~255	1	1	247	0x4202
C02.03	Modbus应答延迟	0~20ms	0	0	20	0x4203
C02.04	Modbus通讯超时	0:无效，0.1s~60.0s	2	0	60	0x4204
C02.06	Modbus通讯设定值单位选择	0:百分比 1:频率	0	0	1	0x4206
C02.07	Modbus写功能码更新非易失存储	0:更新 1:不更新	0	0	1	0x4207
C06组:EtherCAT通讯设置						
C06.00	EtherCAT从站站点正名	0~65535	0	0	65535	0x4600
C06.01	EtherCAT从站站点别名	0~65535	0	0	65535	0x4601
C06.04	EtherCAT状态机	0:NaN 1:初始化 2:预操作 NaN 4:安全操作 NaN NaN NaN 8:操作	0	0	8	0x4604
C06.05	EtherCAT协议栈版本	0~655.35	0	0	655.35	0x4605
C06.06	CIA402控制字	0~0xFFFF	0	0	65535	0x4606
C06.07	CIA402状态字	0~0xFFFF	0	0	65535	0x4607
C06.08	博能控制器功能块	0:无 1:变频模式功能块	0	0	1	0x4608

6.4 D组-电机参数组

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
D00组:马达0基本参数						
D00.00	马达类型选择	0:感应马达 1:永磁同步达(预约)	0	0	1	0x5000
D00.01	马达额定功率	0.00~655.35kW	0.55	0	655.35	0x5001
D00.02	马达额定电压	0~1500V	380	0	1500	0x5002
D00.03	马达额定电流	0.00~655.35A	1.6	0	655.35	0x5003
D00.04	马达额定频率	0.0~600.00Hz	50	0	600	0x5004
D00.05	马达额定转速	0~65535rpm	1330	0	65535	0x5005
D00.06	马达最大转速	0.0%~300.0%额定转速	100	0	300	0x5006
D00.07	马达最小转速	0.0%~300.0%额定转速	0	0	300	0x5007
D00.08	马达最大电流	0.0%~300.0%额定电流	100	0	300	0x5008
D00.09	马达极对数	只读	2	0	64	0x5009
D01组:马达0辨识参数						
D01.00	异步马达定子电阻	0.000~65.535ohm	14.477	0	65.535	0x5100
D01.01	异步马达转子电阻	0.000~65.535ohm	8.469	0	65.535	0x5101
D01.02	异步马达漏感	0.000~65.535mH	51.3	0	655.35	0x5102
D01.03	异步马达互感	0.0~6553.5mH	545.3	0	6553.5	0x5103
D01.04	异步马达空载电流	0.00~655.35A	1.28	0	655.35	0x5104

6.5 E组-故障保护与记录

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
E00组:故障处理						
E00.00	外部故障1来源	0:无效 1预留 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x6000
E00.10	故障自动复位功能	0:无效 1:有效	0	0	1	0x600A
E00.11	故障复位次数重置时间	0.0~3600.0s	180	0	3600	0x600B
E00.12	故障复位间隔时间	0.0~600.0s	30	0	600	0x600C
E00.13	故障复位次数	0~5	5	0	5	0x600D
E00.14	不可复位异常码1	0~51	0	0	51	0x600E
E00.15	不可复位异常码2	0~51	0	0	51	0x600F
E00.23	自动复位后重启功能	0:无效 1:有效	0	0	1	0x6017
E00.24	允许重启的异常来源	0:指定异常码允许重 1:指定异常码不允许重启	0	0	1	0x6018
E00.25	指定的异常码1	0~51	0	0	51	0x6019
E00.26	指定的异常码2	0~51	0	0	51	0x601A
E00.36	异常级别修改异常码	0~51	0	0	51	0x6024
E00.37	异常码1的异常级别	0:自由停机 1:预留 2:停机方式停机 3:警告 4:无异常处理停机 3:警告 4:无异常处理	0	0	4	0x6025
E00.38	异常级别修改异常码	0~51	0	0	51	0x6026
E00.39	异常码2的异常级别	0:自由停机 1:预留 2:停机方式停机 3:警告 4:无异常处理方式停 3:警告 4:无异常处理	0	0	4	0x6027

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
E01组:最新故障及故障数据记录						
E01.00	故障码1	0~51	0	0	51	0x6100
E01.01	故障码1子码	0~16	0	0	16	0x6101
E01.02	故障码2	0~51	0	0	51	0x6102
E01.03	故障码2子码	0~16	0	0	16	0x6103
E01.12	故障速度	-300.00~300.00Hz	0	-300	300	0x610C
E01.13	故障电流	0.00~655.35A	0	0	655.35	0x610D
E01.14	故障母线电压	0.0~800.0V	0	0	800	0x610E
E01.15	故障输出转矩	-300.0%~300.0%	0	-300	300	0x610F
E01.18	本次运行时间-时	0~65535	0	0	65535	0x6112
E01.19	本次运行时间-秒	0~65535	0	0	65535	0x6113
E01.20	累计运行时间-时	0~65535	0	0	65535	0x6114
E01.21	累计运行时间-秒	0~65535	0	0	65535	0x6115
E01.22	故障输出电压	0~6553.5V	0	0	6553.5	0x6116
E01.23	故障PM状态字	0~65535	0x0	0x0	0xFFFF	0x6117
E02组:前一次故障及故障数据记录						
E02.00	故障码1	0~51	0	0	51	0x6200
E02.01	故障码1子码	1~16	0	0	16	0x6201
E02.02	故障码2	0~51	0	0	51	0x6202
E02.03	故障码2子码	1~16	0	0	16	0x6203
E02.12	故障速度	-300.00~300.00Hz	0	-300	300	0x620C
E02.13	故障电流	0.0~6553.5A	0	0	655.35	0x620D
E02.14	故障母线电压	0.0~800.0V	0	0	800	0x620E
E02.15	故障输出转矩	-300.0%~300.0%	0	-300	300	0x620F
E02.18	本次运行时间-时	0~65535	0	0	65535	0x6212
E02.19	本次运行时间-秒	0~65535	0	0	65535	0x6213
E02.20	累计运行时间-时	0~65535	0	0	65535	0x6214
E02.21	累计运行时间-秒	0~65535	0	0	65535	0x6215
E02.22	故障输出电压	0~6553.5V	0	0	6553.5	0x6216
E02.23	故障PM状态字	0~65535	0x0	0x0	0xFFFF	0x6217
E03组:前两次故障及故障数据记录						
E03.00	故障码1	0~51	0	0	51	0x6300
E03.01	故障码1子码	1~16	0	0	16	0x6301
E03.02	故障码2	0~51	0	0	51	0x6302
E03.03	故障码2子码	1~16	0	0	16	0x6303
E03.12	故障速度	-300.00~300.00Hz	0	-300	300	0x630C
E03.13	故障电流	0.0~6553.5A	0	0	655.35	0x630D
E03.14	故障母线电压	0.0~800.0V	0	0	800	0x630E
E03.15	故障输出转矩	-300.0%~300.0%	0	-300	300	0x630F
E03.18	本次运行时间-时	0~65535	0	0	65535	0x6312
E03.19	本次运行时间-秒	0~65535	0	0	65535	0x6313
E03.20	累计运行时间-时	0~65535	0	0	65535	0x6314
E03.21	累计运行时间-秒	0~65535	0	0	65535	0x6315
E03.22	故障输出电压	0~6553.5V	0	0	6553.5	0x6316
E03.23	故障PM状态字	0~65535	0x0	0x0	0xFFFF	0x6317

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
E04组:前三次故障及故障数据记录						
E04.00	故障码1	0~51	0	0	51	0x6400
E04.01	故障码1子码	1~16	0	0	16	0x6401
E04.02	故障码2	0~51	0	0	51	0x6402
E04.03	故障码2子码	1~16	0	0	16	0x6403
E04.12	故障速度	-300.00~300.00Hz	0	-300	300	0x640C
E04.13	故障电流	0.0~6553.5A	0	0	655.35	0x640D
E04.14	故障母线电压	0.0~800.0V	0	0	800	0x640E
E04.15	故障输出转矩	-300.0%~300.0%	0	-300	300	0x640F
E04.18	本次运行时间-时	0~65535	0	0	65535	0x6412
E04.19	本次运行时间-秒	0~65535	0	0	65535	0x6413
E04.20	累计运行时间-时	0~65535	0	0	65535	0x6414
E04.21	累计运行时间-秒	0~65535	0	0	65535	0x6415
E04.22	故障输出电压	0~6553.5V	0	0	6553.5	0x6416
E04.23	故障PM状态字	0~65535	0x0	0x0	0xFFFF	0x6417
E05组:前四次故障及故障数据记录						
E05.00	故障码1	0~51	0	0	51	0x6500
E05.01	故障码1子码	1~16	0	0	16	0x6501
E05.02	故障码2	0~51	0	0	51	0x6502
E05.03	故障码2子码	1~16	0	0	16	0x6503
E05.12	故障速度	-300.00~300.00Hz	0	-300	300	0x650C
E05.13	故障电流	0.0~6553.5A	0	0	655.35	0x650D
E05.14	故障母线电压	0.0~800.0V	0	0	800	0x650E
E05.15	故障输出转矩	-300.0%~300.0%	0	-300	300	0x650F
E05.18	本次运行时间-时	0~65535	0	0	65535	0x6512
E05.19	本次运行时间-秒	0~65535	0	0	65535	0x6513
E05.20	累计运行时间-时	0~65535	0	0	65535	0x6514
E05.21	累计运行时间-秒	0~65535	0	0	65535	0x6515
E05.22	故障输出电压	0~6553.5V	0	0	6553.5	0x6516
E05.23	故障PM状态字	0~65535	0x0	0x0	0xFFFF	0x6517
E06组:前五次故障及故障数据记录						
E06.00	故障码1	0~51	0	0	51	0x6600
E06.01	故障码1子码	1~16	0	0	16	0x6601
E06.02	故障码2	0~51	0	0	51	0x6602
E06.03	故障码2子码	1~16	0	0	16	0x6603
E06.12	故障速度	-300.00~300.00Hz	0	-300	300	0x660C
E06.13	故障电流	0.0~6553.5A	0	0	655.35	0x660D
E06.14	故障母线电压	0.0~800.0V	0	0	800	0x660E
E06.15	故障输出转矩	-300.0%~300.0%	0	-300	300	0x660F
E06.18	本次运行时间-时	0~65535	0	0	65535	0x6612
E06.19	本次运行时间-秒	0~65535	0	0	65535	0x6613
E06.20	累计运行时间-时	0~65535	0	0	65535	0x6614
E06.21	累计运行时间-秒	0~65535	0	0	65535	0x6615
E06.22	故障输出电压	0~6553.5V	0	0	6553.5	0x6616
E06.23	故障PM状态字	0~65535	0x0	0x0	0xFFFF	0x6617

6.6 F组-自由功能块与工艺参数组

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
F00组:逻辑运算模块						
F00.00	逻辑与模块A输入1	0:无效 其它:二进制互联参数	0	0	0	0x7000
F00.01	逻辑与模块A输入2	0:无效 其它:二进制互联参数	0	0	0	0x7001
F00.02	逻辑与模块A输入3	0:无效 其它:二进制互联参数	0	0	0	0x7002
F00.03	逻辑与模块A输入4	0:无效 其它:二进制互联参数	0	0	0	0x7003
F00.05	逻辑与模块B输入1	0:无效 其它:二进制互联参数	0	0	0	0x7005
F00.06	逻辑与模块B输入2	0:无效 其它:二进制互联参数	0	0	0	0x7006
F00.07	逻辑与模块B输入3	0:无效 其它:二进制互联参数	0	0	0	0x7007
F00.08	逻辑与模块B输入4	0:无效 其它:二进制互联参数	0	0	0	0x7008
F00.20	逻辑非模块A输入	0:无效 其它:二进制互联参数	0	0	0	0x7014
F00.22	逻辑非模块B输入	0:无效 其它:二进制互联参数	0	0	0	0x7016
F00.24	逻辑非模块C输入	0:无效 其它:二进制互联参数	0	0	0	0x7018
F00.26	逻辑非模块D输入	0:无效 其它:二进制互联参数	0	0	0	0x701A
F00.36	逻辑或模块A输入1	0:无效 其它:二进制互联参数	0	0	0	0x7024
F00.37	逻辑或模块A输入2	0:无效 其它:二进制互联参数	0	0	0	0x7025
F00.38	逻辑或模块A输入3	0:无效 其它:二进制互联参数	0	0	0	0x7026
F00.39	逻辑或模块A输入4	0:无效 其它:二进制互联参数	0	0	0	0x7027
F00.41	逻辑或模块B输入1	0:无效 其它:二进制互联参数	0	0	0	0x7029
F00.42	逻辑或模块B输入2	0:无效 其它:二进制互联参数	0	0	0	0x702A
F00.43	逻辑或模块B输入3	0:无效 其它:二进制互联参数	0	0	0	0x702B
F00.44	逻辑或模块B输入4	0:无效 其它:二进制互联参数	0	0	0	0x702C
F00.76	逻辑延时模块A输入	0:无效 其它:二进制互联参数	0	0	0	0x704C
F00.77	逻辑延时模块A功能选择	0:开通延时 1:关断延时 2:双向延时	0	0	2	0x704D
F00.78	逻辑延时模块A延迟时间	0~60000ms	0	0	60000	0x704E
F00.79	逻辑延时模块B输入	0:无效 其它:二进制互联参数	0	0	0	0x704F
F00.80	逻辑延时模块B功能选择	0:开通延时 1:关断延时 2:双向延时	0	0	2	0x7050
F00.81	逻辑延时模块B延迟时间	0~60000ms	0	0	60000	0x7051

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
F01组:算术运算模块						
F01.00	加法模块A输入1	0:00 其它:模拟量互联参数	0	0	0	0x7100
F01.01	加法模块A输入2	0:00 其它:模拟量互联参数	0	0	0	0x7101
F01.02	加法模块A输入3	0:00 其它:模拟量互联参数	0	0	0	0x7102
F01.03	加法模块A输入4	0:00 其它:模拟量互联参数	0	0	0	0x7103
F01.05	加法模块B输入1	0:00 其它:模拟量互联参数	0	0	0	0x7105
F01.06	加法模块B输入2	0:00 其它:模拟量互联参数	0	0	0	0x7106
F01.07	加法模块B输入3	0:00 其它:模拟量互联参数	0	0	0	0x7107
F01.08	加法模块B输入4	0:00 其它:模拟量互联参数	0	0	0	0x7108
F01.15	减法模块A输入1	0:00 其它:模拟量互联参数	0	0	0	0x710F
F01.16	减法模块A输入2	0:00 其它:模拟量互联参数	0	0	0	0x7110
F01.18	减法模块B输入1	0:00 其它:模拟量互联参数	0	0	0	0x7112
F01.19	减法模块B输入2	0:00 其它:模拟量互联参数	0	0	0	0x7113
F01.37	绝对值模块A输入	0:00 其它:模拟量互联参数	0	0	0	0x7125
F01.39	绝对值模块B输入	0:00 其它:模拟量互联参数	0	0	0	0x7127
F01.41	比较模块A输入1	0:00 其它:模拟量互联参数	0	0	0	0x7129
F01.42	比较模块A输入2	0:00 其它:模拟量互联参数	0	0	0	0x712A
F01.44	比较模块B输入1	0:00 其它:模拟量互联参数	0	0	0	0x712C
F01.45	比较模块B输入2	0:00 其它:模拟量互联参数	0	0	0	0x712D
F01.61	数据选择器A命令来源1	0:00 1:01 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x713D
F01.62	数据选择器A命令来源2	同上	0	0	10	0x713E
F01.63	数据选择器A数据来源1	0:00 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位计 8~10:预留 其它:模拟量互联参数	0	0	10	0x713F

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
F01组:算术运算模块						
F01.64	数据选择器A数据来源2	同上	0	0	10	0x7140
F01.65	数据选择器A数据来源3	同上	0	0	10	0x7141
F01.66	数据选择器A数据来源4	同上	0	0	10	0x7142
F01.67	数据选择器B命令来源1	0:00 1:01 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x7143
F01.68	数据选择器B命令来源2	同上	0	0	10	0x7144
F01.69	数据选择器B数据来源1	0:00 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位计 8~10:预留 其它:模拟量互联参数	0	0	10	0x7145
F01.70	数据选择器B数据来源2	同上	0	0	10	0x7146
F01.71	数据选择器B数据来源3	同上	0	0	10	0x7147
F01.72	数据选择器B数据来源4	同上	0	0	10	0x7148
F03组:过程PID模块						
F03.00	PID功能有效信号	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x7300
F03.01	PID运算使能信号	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x7301
F03.02	PID作用方向	0:正方向 1:反方向	0	0	1	0x7302
F03.03	PID采样计算	1~20	2	1	20	0x7303
F03.04	PID给定源来源	0:F03.05 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位计 8~10:预留 其它:模拟量互联参数	0	0	10	0x7304
F03.05	PID数值给定	-600.0~600.0%	0	-600	600	0x7305
F03.06	PID给定冻结使能	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x7306

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
F03组:过程PID模块						
F03.07	PID给定滤波时间	0~60000ms	0	0	60000	0x7307
F03.08	PID反馈源来源	0:00 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位计 8~10:预留 其它:模拟量互联参数	0	0	10	0x7308
F03.09	PID反馈滤波时间	0~60000ms	0	0	60000	0x7309
F03.10	PID偏差附加给定	0:00 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位计 8~10:预留 其它:模拟量互联参数	0	0	10	0x730A
F03.11	比例增益KP	0.00~125.00	1	0	125	0x730B
F03.12	比例增益系数	0:100.0% 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位器 8~10:预留 其它:模拟量互联参数	0	0	10	0x730C
F03.13	积分时间Ti	0~60000ms	10	0	60000	0x730D
F03.14	积分时间系数	0:100.0% 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位器 8~10:预留 其它:模拟量互联参数	0	0	10	0x730E
F03.15	微分时间Td1	0~60000ms	0	0	60000	0x730F
F03.16	微分时间系数	0:100.0% 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位器 8~10:预留 其它:模拟量互联参数	0	0	10	0x7310

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
F03组:过程PID模块						
F03.17	PID输出积分初值	0:100.0% 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位器 8~10:预留 其它:模拟量互联参数	0	0	10	0x7311
F03.18	PID输出附加给定	同上	0	0	10	0x7312
F03.19	PID积分分量强制使能	0:无效 1:有效 2~5:DI0~DI3 6~10:预留 其它:二进制互联参数	0	0	10	0x7313
F03.20	PID积分分量强制值	0:00 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位器 8~10:预留 其它:模拟量互联参数	0	0	10	0x7314
F03.21	PID输出极限	0.0~600.0%	100	0	600	0x7315
F03.22	PID输出上限来源	0:100% 1:多段设定值1 2:AI 3:电位器 4~5:预留 6:多段值给定 7:电动电位器 8~10:预留 其它:模拟量互联参数	0	0	10	0x7316
F03.23	PID输出下限来源	同上	0	0	10	0x7317
F03.24	PID输出限幅上升/下降时间	0.00~100.00S	0	0	100	0x7318
F03.25	PID偏差死区使能	0:禁止 1:使能	0	0	1	0x7319
F03.26	PID偏差死区范围	0.0~100.0%	0	0	100	0x731A
F03.27	PID反馈丢失检测值	0.0~100.0%	0	0	100	0x731B
F03.28	PID反馈丢失检测时间	0.0~60.0S	0	0	60	0x731C

6.7 P组-互联参数组

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
P00组: 硬件状态（二进制互联参数）						
P00.00	逻辑0	0	0	0	0	0xE000
P00.01	逻辑1	1	1	1	1	0xE001
P00.02	多功能数字输入DI0	0~1	0	0	1	0xE002
P00.03	多功能数字输入DI1	0~1	0	0	1	0xE003
P00.04	多功能数字输入DI2	0~1	0	0	1	0xE004
P00.05	多功能数字输入DI3	0~1	0	0	1	0xE005
P00.10	多功能数字输入DI0取反	0~1	0	0	1	0xE00A
P00.11	多功能数字输入DI1取反	0~1	0	0	1	0xE00B
P00.12	多功能数字输入DI2取反	0~1	0	0	1	0xE00C
P00.13	多功能数字输入DI3取反	0~1	0	0	1	0xE00D
P01组:系统控制字与状态（二进制互联参数）						
P01.00	开机准备好	0~1	0	0	1	0xE100
P01.01	运行准备好	0~1	0	0	1	0xE101
P01.02	运行	0~1	0	0	1	0xE102
P01.03	故障激活	0~1	0	0	1	0xE103
P01.06	开机封锁	0~1	0	0	1	0xE106
P01.07	报警激活	0~1	0	0	1	0xE107
P01.09	比较值到达	0~1	0	0	1	0xE109
P01.12	速度正向	0~1	0	0	1	0xE10C
P01.13	IGBT运行	0~1	0	0	1	0xE10D
P01.14	点动运行有效	0~1	0	0	1	0xE10E
P01.15	预励磁启动	0~1	0	0	1	0xE10F
P01.16	开启直流制动	0~1	0	0	1	0xE110
P01.20	开机未准备好	0~1	0	0	1	0xE114
P01.21	运行未准备好	0~1	0	0	1	0xE115
P01.22	未运行	0~1	0	0	1	0xE116
P01.23	无故障	0~1	0	0	1	0xE117
P01.26	开机未封锁	0~1	0	0	1	0xE11A
P01.27	无报警	0~1	0	0	1	0xE11B
P01.29	比较值未到达	0~1	0	0	1	0xE11D
P01.32	速度负向	0~1	0	0	1	0xE120
P01.33	IGBT封锁	0~1	0	0	1	0xE121
P01.34	点动运行无效	0~1	0	0	1	0xE122
P01.35	预励磁完成	0~1	0	0	1	0xE123
P01.36	直流制动结束	0~1	0	0	1	0xE124
P01.44	RFG加速	0~1	0	0	1	0xE12C
P01.45	RFG减速	0~1	0	0	1	0xE12D
P01.46	RFG恒速	0~1	0	0	1	0xE12E
P01.62	马达预过载状态	0~1	0	0	1	0xE13E
P01.63	零速给定运行	0~1	0	0	1	0xE13F
P01.64	直流母线带电标志	0~1	0	0	1	0xE140
P01.65	马达速度为零	0~1	0	0	1	0xE141
P01.66	PID功能生效	0~1	0	0	1	0xE142
P01.67	PID运算使能	0~1	0	0	1	0xE143
P01.68	PID作用方向	0~1	0	0	1	0xE144
P01.69	PID给定冻结使能	0~1	0	0	1	0xE145
P01.70	PID积分分量强制使	0~1	0	0	1	0xE146

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
P01组:系统控制字与状态（二进制互联参数）						
P01.71	PID偏差死区使能	0~1	0	0	1	0xE147
P01.72	PID饱和状态	0~1	0	0	1	0xE148
P01.73	马达过温保护标志	0~1	0	0	1	0xE149
P01.74	马达过温警告标志	0~1	0	0	1	0xE14A
P01.75	马达选择bit0	0~1	0	0	1	0xE14B
P01.77	RFG选择bit0	0~1	0	0	1	0xE14D
P01.78	RFG选择bit1	0~1	0	0	1	0xE14E
P01.79	多段给定选择1	0~1	0	0	1	0xE14F
P01.80	多段给定选择2	0~1	0	0	1	0xE150
P01.81	多段给定选择3	0~1	0	0	1	0xE151
P01.85	RFG运行标志	0~1	0	0	1	0xE155
P02组: FBA与故障标志（二进制互联参数）						
P02.00	总线适配器A.PZD1.0	0~1	0	0	1	0xE200
P02.01	总线适配器A.PZD1.1	0~1	0	0	1	0xE201
P02.02	总线适配器A.PZD1.2	0~1	0	0	1	0xE202
P02.03	总线适配器A.PZD1.3	0~1	0	0	1	0xE203
P02.04	总线适配器A.PZD1.4	0~1	0	0	1	0xE204
P02.05	总线适配器A.PZD1.5	0~1	0	0	1	0xE205
P02.06	总线适配器A.PZD1.6	0~1	0	0	1	0xE206
P02.07	总线适配器A.PZD1.7	0~1	0	0	1	0xE207
P02.08	总线适配器A.PZD1.8	0~1	0	0	1	0xE208
P02.09	总线适配器A.PZD1.9	0~1	0	0	1	0xE209
P02.10	总线适配器A.PZD1.10	0~1	0	0	1	0xE20A
P02.11	总线适配器A.PZD1.11	0~1	0	0	1	0xE20B
P02.12	总线适配器A.PZD1.12	0~1	0	0	1	0xE20C
P02.13	总线适配器A.PZD1.13	0~1	0	0	1	0xE20D
P02.14	总线适配器A.PZD1.14	0~1	0	0	1	0xE20E
P02.15	总线适配器A.PZD1.15	0~1	0	0	1	0xE20F
P02.32	Modbus通讯启停命令	0~1	0	0	1	0xE220
P02.33	Modbus通讯点动启停	0~1	0	0	1	0xE221
P02.35	Modbus通讯故障复位	0~1	0	0	1	0xE223
P02.36	Modbus通讯反向运行	0~1	0	0	1	0xE224
P03组: 自由功能模块1（二进制互联参数）						
P03.00	逻辑与模块A输出	0~1	0	0	1	0xE300
P03.01	逻辑与模块B输出	0~1	0	0	1	0xE301
P03.04	逻辑非模块A输出	0~1	0	0	1	0xE304
P03.05	逻辑非模块B输出	0~1	0	0	1	0xE305
P03.06	逻辑非模块C输出	0~1	0	0	1	0xE306
P03.07	逻辑非模块D输出	0~1	0	0	1	0xE307
P03.12	逻辑或模块A输出	0~1	0	0	1	0xE30C
P03.13	逻辑或模块B输出	0~1	0	0	1	0xE30D
P03.20	逻辑延时模块A输出	0~1	0	0	1	0xE314
P03.21	逻辑延时模块B输出	0~1	0	0	1	0xE315
P03.24	比较模块A大于标志	0~1	0	0	1	0xE318
P03.25	比较模块A等于标志	0~1	0	0	1	0xE319
P03.26	比较模块A小于标志	0~1	0	0	1	0xE31A
P03.27	比较模块B大于标志	0~1	0	0	1	0xE31B
P03.28	比较模块B等于标志	0~1	0	0	1	0xE31C
P03.29	比较模块B小于标志	0~1	0	0	1	0xE31D
P03.32	绝对值模块A输入量符号	0~1	0	0	1	0xE320
P03.33	绝对值模块B输入量符号	0~1	0	0	1	0xE321
P03.34	绝对值模块A溢出标	0~1	0	0	1	0xE322
P03.35	绝对值模块B溢出标	0~1	0	0	1	0xE323
P03.36	加法模块A溢出标志	0~1	0	0	1	0xE324
P03.37	加法模块B溢出标志	0~1	0	0	1	0xE325
P03.39	减法模块A溢出标志	0~1	0	0	1	0xE327
P03.40	减法模块B溢出标志	0~1	0	0	1	0xE328

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
P06组: 运行状态与外设（模拟量互联参数）						
P06.00	当前状态机	-32768~32767	0	-32768	32767	0xE600
P06.01	目标频率	-32768~32767	0	-32768	32767	0xE601
P06.02	给定频率	-32768~32767	0	-32768	32767	0xE602
P06.03	输出频率	-32768~32767	0	-32768	32767	0xE603
P06.04	目标速度	-32768~32767	0	-32768	32767	0xE604
P06.05	给定速度	-32768~32767	0	-32768	32767	0xE605
P06.06	马达转速	-32768~32767	0	-32768	32767	0xE606
P06.07	输出电压	-32768~32767	0	-32768	32767	0xE607
P06.08	输出电流	-32768~32767	0	-32768	32767	0xE608
P06.09	输出功率	-32768~32767	0	-32768	32767	0xE609
P06.10	给定转矩	-32768~32767	0	-32768	32767	0xE60A
P06.11	输出转矩	-32768~32767	0	-32768	32767	0xE60B
P06.12	转矩电流	-32768~32767	0	-32768	32767	0xE60C
P06.13	励磁电流	-32768~32767	0	-32768	32767	0xE60D
P06.14	直流母线电压	-32768~32767	0	-32768	32767	0xE60E
P06.15	散热器温度	-32768~32767	0	-32768	32767	0xE60F
P06.30	模拟量输入AI转换结果	-32768~32767	-32768	32767	65535	0xE61E
P06.31	电位器输入	-32768~32767	-32768	32767	65535	0xE61F
P06.34	控制板AO输出值	-32768~32767	-32768	32767	65535	0xE622
P07组: 通信（模拟量互联参数）						
P07.00	总线适配器A.PZD1	0~65535	0	0	65535	0xE700
P07.01	总线适配器A.PZD2	0~65535	0	0	65535	0xE701
P07.02	总线适配器A.PZD3	0~65535	0	0	65535	0xE702
P07.03	总线适配器A.PZD4	0~65535	0	0	65535	0xE703
P07.04	总线适配器A.PZD5	0~65535	0	0	65535	0xE704
P07.05	总线适配器A.PZD6	0~65535	0	0	65535	0xE705
P07.06	总线适配器A.PZD7	0~65535	0	0	65535	0xE706
P07.07	总线适配器A.PZD8	0~65535	0	0	65535	0xE707
P07.08	总线适配器A.PZD9	0~65535	0	0	65535	0xE708
P07.09	总线适配器A.PZD10	0~65535	0	0	65535	0xE709
P07.10	总线适配器A.PZD11	0~65535	0	0	65535	0xE70A
P07.11	总线适配器A.PZD12	0~65535	0	0	65535	0xE70B
P07.12	总线适配器A.PZD13	0~65535	0	0	65535	0xE70C
P07.13	总线适配器A.PZD14	0~65535	0	0	65535	0xE70D
P07.14	总线适配器A.PZD15	0~65535	0	0	65535	0xE70E
P07.15	总线适配器A.PZD16	0~65535	0	0	65535	0xE70F
P07.32	Modbus控制命令	0~4	0	0	65535	0xE720
P07.33	Modbus通讯设定值1	-32768~32767	0	-32768	32767	0xE721
P07.34	Modbus通讯设定值2	-32768~32768	0	-32768	32767	0xE722
P07.35	Modbus通讯设定值1标幺值	0~65535	0	0	65535	0xE723
P07.36	Modbus通讯设定值2标幺值	0~65535	0	0	65535	0xE724
P08组: 自由功能模块（模拟量互联参数）						
P08.00	加法模块A输出	-32768~32767	0	-32768	32767	0xE800
P08.01	加法模块B输出	-32768~32767	0	-32768	32767	0xE801
P08.04	减法模块A输出	-32768~32767	0	-32768	32767	0xE804
P08.05	减法模块B输出	-32768~32767	0	-32768	32767	0xE805
P08.24	绝对值模块A输出	-32768~32767	0	-32768	32767	0xE818
P08.25	绝对值模块B输出	-32768~32767	0	-32768	32767	0xE819
P08.41	数据选择器A输出	-32768~32767	0	-32768	32767	0xE829
P08.42	数据选择器B输出	-32768~32767	0	-32768	32767	0xE82A

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
P09组: 工艺应用（模拟量互联参数）						
P09.00	过程PID输出量（限幅后）	-32768~32767	0	-32768	32767	0xE900
P09.01	过程PID输出量（限幅前）	-32768~32767	0	-32768	32767	0xE901
P09.02	过程PID比例输出	-32768~32767	0	-32768	32767	0xE902
P09.03	过程PID积分输出	-32768~32767	0	-32768	32767	0xE903
P09.04	过程PID微分输出	-32768~32767	0	-32768	32767	0xE904
P09.05	过程PID给定量	-32768~32767	0	-32768	32767	0xE905
P09.06	过程PID反馈量	-32768~32767	0	-32768	32767	0xE906
P09.07	过程PID偏差值	-32768~32767	0	-32768	32767	0xE907
P09.08	过程PID无附加值前偏差值	-32768~32767	0	-32768	32767	0xE908
P10组: PM系统内部变量（模拟量互联参数）						
P10.00	M轴给定电流	0~65535	0	-32768	32767	0xEA00
P10.01	M轴反馈电流	0~65535	0	-32768	32767	0xEA01
P10.02	T轴给定电流	0~65535	0	-32768	32767	0xEA02
P10.03	T轴反馈电流	0~65535	0	-32768	32767	0xEA03
P10.04	给定频率	0~65535	0	-32768	32767	0xEA04
P10.05	反馈频率	0~65535	0	-32768	32767	0xEA05
P10.06	同步频率	0~65535	0	-32768	32767	0xEA06
P10.07	编码器频率	0~65535	0	-32768	32767	0xEA07
P10.08	PM监控变量8	0~65535	0	-32768	32767	0xEA08
P10.09	PM监控变量9	0~65535	0	-32768	32767	0xEA09
P10.10	M轴给定电压	0~65535	0	-32768	32767	0xEA0A
P10.11	T轴给定电压	0~65535	0	-32768	32767	0xEA0B
P10.12	PM监控变量12	0~65535	0	-32768	32767	0xEA0C
P10.13	PM监控变量13	0~65535	0	-32768	32767	0xEA0D
P10.14	PM监控变量14	0~65535	0	-32768	32767	0xEA0E
P10.15	PM监控变量15	0~65535	0	-32768	32767	0xEA0F
P10.16	PM监控变量16	0~65535	0	-32768	32767	0xEA10
P10.17	PM监控变量17	0~65535	0	-32768	32767	0xEA11
P10.18	PM监控变量18	0~65535	0	-32768	32767	0xEA12
P10.19	CRC校验计数	0~65535	0	-32768	32767	0xEA13
P10.20	PM监控变量20	0~65535	0	-32768	32767	0xEA14
P10.21	PM监控变量21	0~65535	0	-32768	32767	0xEA15
P10.22	PM监控变量22	0~65535	0	-32768	32767	0xEA16
P10.23	PM监控变量23	0~65535	0	-32768	32767	0xEA17
P10.24	PM监控变量24	0~65535	0	-32768	32767	0xEA18
P10.25	PM监控变量25	0~65535	0	-32768	32767	0xEA19
P10.26	监控通道1	0~65535	0	-32768	32767	0xEA1A
P10.27	监控通道2	0~65535	0	-32768	32767	0xEA1B
P10.28	监控通道3	0~65535	0	-32768	32767	0xEA1C
P10.29	监控通道4	0~65535	0	-32768	32767	0xEA1D
P10.30	PM监控变量30	0~65535	0	-32768	32767	0xEA1E
P10.31	PM监控变量31	0~65535	0	-32768	32767	0xEA1F
P10.32	状态机	0~65535	0	-32768	32767	0xEA20
P10.33	U相电流	0~65535	0	-32768	32767	0xEA21
P10.34	V相电流	0~65535	0	-32768	32767	0xEA22

功能码	名称	设定范围	出厂值	下限值	上限值	通讯地址
P11组: CM系统内部变量（模拟量互联参数）						
P11.00	固定值0%	0~65535	0	-32768	32767	0xEB00
P11.01	固定值100%	0~65535	0	-32768	32767	0xEB01
P11.02	固定值200%	0~65535	0	-32768	32767	0xEB02
P11.03	固定值400%	0~65535	0	-32768	32767	0xEB03
P11.04	固定值600%	0~65535	0	-32768	32767	0xEB04
P11.05	固定值-100%	0~65535	0	-32768	32767	0xEB05
P11.06	固定值-200%	0~65535	0	-32768	32767	0xEB06
P11.07	固定值-400%	0~65535	0	-32768	32767	0xEB07
P11.08	固定值-600%	0~65535	0	-32768	32767	0xEB08
P13组: 系统给定与反馈（模拟量互联参数）						
P13.00	马达实际速度	-32768~32767	0	-32768	32767	0xED00
P13.01	马达最终设定速度	-32768~32767	0	-32768	32767	0xED01
P13.02	主速度给定	-32768~32767	0	-32768	32767	0xED02
P13.03	辅速度给定	-32768~32767	0	-32768	32767	0xED03
P13.04	正反转限制前速度给定	-32768~32767	0	-32768	32767	0xED04
P13.05	限幅前速度给定	-32768~32767	0	-32768	32767	0xED05
P13.06	限幅后速度给定	-32768~32767	0	-32768	32767	0xED06
P13.07	最小速度限制后速度给定	-32768~32767	0	-32768	32767	0xED07
P13.08	RFG输入速度给定	-32768~32767	0	-32768	32767	0xED08
P13.09	RFG输出速度给定	-32768~32767	0	-32768	32767	0xED09
P13.10	附加速度给定	-32768~32767	0	-32768	32767	0xED0A
P13.11	功能最终给定速度	-32768~32767	0	-32768	32767	0xED0B
P13.12	RFG模块输入值	-32768~32767	0	-32768	32767	0xED0C
P13.13	电机转动圈数低位	0~65535	0	0	65535	0xED0D
P13.14	电机转动圈数高位	0~65535	0	0	65535	0xED0E
P13.15	正向最大速度	-32768~32767	0	-32768	32767	0xED0F
P13.16	负向最大速度	-32768~32767	0	-32768	32767	0xED10
P13.22	电动电位器输出	-32768~32767	0	-32768	32767	0xED16
P13.23	多段给定选择输出	-32768~32767	0	-32768	32767	0xED17
P13.24	多段给定值1	-32768~32767	0	-32768	32767	0xED18
P13.25	多段给定值2	-32768~32767	0	-32768	32767	0xED19
P13.26	多段给定值3	-32768~32767	0	-32768	32767	0xED1A
P13.27	多段给定值4	-32768~32767	0	-32768	32767	0xED1B
P13.28	多段给定值5	-32768~32767	0	-32768	32767	0xED1C
P13.29	多段给定值6	-32768~32767	0	-32768	32767	0xED1D
P13.30	多段给定值7	-32768~32767	0	-32768	32767	0xED1E
P13.31	多段给定值8	-32768~32767	0	-32768	32767	0xED1F

7 Modbus-RTU协议

AD驱动器使用标准RS485通讯接口，采用MODBUS通讯协议，支持驱动器与上位机或PLC进行串行通讯。AD驱动器的通讯协议包含三个层次：物理层、数据链路层和应用层。物理层和数据链路层采用了基于RS485的Modbus协议，应用层包含了控制AD驱动器运行、停止、参数读写等各种操作方法。

Modbus 协议为主从式协议。主机和从机之间的通讯有两类：主机请求，从机应答；主机广播，从机不应答。任何时候总线上只有一个设备在进行发送。主机对从机进行轮询，从机在未获得主机的命令情况下不能发送报文。主机在通讯不正确时可重复发命令，如果在给定的时间内没有收到回应，则认为所轮询的从机丢失。如果从机不能执行某一报文，则向主机发送一个异常信息。从机之间不能直接通讯，必须通过主机的软件，读出一个从机的数据，再发送到另一个从机。从机地址的范围：0 至247，地址0的报文为广播报文。

RTU数据帧

每个字节的数据格式和发送顺序：1个起始位＋8 个数据位（低位先发送）＋1 个奇偶校验位或无校验位＋1 个或 2 个停止位。

使用RTU模式，消息发送至少要以3.5个字符时间的停顿间隔开始。在网络波特率下多样的字符时间，这是最容易实现的(如下图的T1-T2-T3-T4所示)。传输的第一个域是设备地址。可以使用的传输字符是十六进制的0...9,A...F。网络设备不断侦测网络总线，包括停顿间隔时间内。当第一个域（地址域）接收到，每个设备都进行解码以判断是否发往自己的。在最后一个传输字符之后，一个至少3.5个字符时间的停顿标定了消息的结束。一个新的消息可在此停顿后开始。

整个消息帧必须作为一连续的流转输。如果在帧完成之前有超过1.5个字符时间的停顿时间，接收设备将刷新不完整的消息并假定下一字节是一个新消息的地址域。同样地，如果一个新消息在小于3.5个字符时间内接着前个消息开始，接收的设备将认为它是前一消息的延续。这将导致一个错误，因为在最后的CRC域的值不可能是正确的。

起始至少3.5个字符的空闲	从机地址	功能码	数据	校验	起始至少3.5个字符的空闲

RTU帧格式：

帧头START	3.5个字符时间
从机地址ADR	通讯地址：1~247
命令码CMD	03：读从机参数；06：写从机参数
数据内容DATA（N-1）	资料内容： 功能码参数地址，功能码参数个数，功能码参数值等。
数据内容DATA（N-2）	
……	
数据内容DATA0	
CRC CHK低位	检测值： CRC值。
CRC CHK高位	
END	3.5个字符时间

A1 驱动器支持 RTU（远程终端单元）模式的 Modbus 协议。驱动器支持的 Modbus 功能码如下：
命令码及通讯数据描述：

CMD	含义	广播	最多寄存器个数
03H	读多个寄存器	否	5
06H	写单个寄存器	是	1
10H	写多个寄存器	是	5

命令码:03H
命令码03H (0000 0011),读取N个字(Word,16bit数据),最多可以连续读取5个字。
例如:从机地址为0x01的驱动器,读取电机目标速度,给定速度,当前电机转速,modbus逻辑起始地址为0x2004,读取连续3个字,则该帧的结构描述如下:

主机发送:

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x03
地址高位	0x20
地址低位	0x04
读取字节高位	0x00
读取字节低位	0x03
CRC低位	0x4F
CRC高位	0xCA

从机正常回应:

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x03
返回数据字节数	0x06
第一个数据高位	0x05
第一个数据低位	0xDC
第二个数据高位	0x00
第二个数据低位	0x00
...	
第N个数据高位	0x00
第N个数据低位	0x00
CRC低位	0xXX
CRC高位	0xXX

驱动器回应电机目标速度0x05DC(1500rpm),给定速度0x0000,当前电机转速0x0000

从机异常响应:

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x83
故障代码	0xXX
CRC低位	0xXX
CRC高位	0xXX

命令码:06H
命令码06H (0000 0110),写一个字(Word)
例如:从机地址为0x01的驱动器,将驱动器的目标速度设置为100%,即modbus逻辑地址0xE721写0x03E8,则该帧的结构描述如下:
RTU 主机命令信息

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x06
地址高位	0xE7
地址低位	0x21
数据高位	0x03
数据低位	0xE8
CRC低位	0xEF
CRC高位	0xCA

从机正常回应

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x06
地址高位	0xE7
地址低位	0x21
数据高位	0x03
数据低位	0xE8
CRC低位	0xEF
CRC高位	0xCA

从机异常响应：

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x86
故障代码	0xXX
CRC低位	0xXX
CRC高位	0xXX

命令码：10H
命令码10H（0001 0000），写N个字（Word）
例如：从机地址为0x01的驱动器，将0x3500地址写3个数据。则该帧的结构描述如下：
RTU 主机命令信息

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x10
地址高位	0x35
地址低位	0x00
写的字节数高位	0x00
写的字节数低位	0x03
写字节总数	0x06
第一个数据高位	0x00
第一个数据低位	0x01
……	……
第N个数据高位	
第N个数据低位	
CRC低位	0xXX
CRC高位	0xXX

从机正常回应

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x10
地址高位	0x35
地址低位	0x00
数据高位	0x00
数据低位	0x03
CRC低位	0x8F
CRC高位	0XC4

从机异常响应：

START	T1-T2-T3-T4
从机地址	0x01
Modbus功能码	0x90
故障代码	0xXX
CRC低位	0xXX
CRC高位	0xXX

异常码

代码	名称	含义
1	非法功能码	接收到不支持的功能码
2	非法地址	请求的寄存器地址不合法，或者寄存器地址和请求读数据个数组合是非法的
3	非法数据值	接收的数据域包含至少一个非法的数据值
4	非法请求数据个数	请求数据的个数大于最大个数
5	只读	只读
6	只能停机修改	只能停机修改
8	没有权限	
9	接收长度不正常	需要接收的数据长度和实际接收不一样

通讯帧错误校验

使用RTU帧格式，帧包括了基于CRC方法计算的帧错误检测域。CRC域检测了整个帧的内容。CRC域是两个字节，包含1位的二进制值。它由传输设备计算后加入到帧中。接收设备重新计算收到帧的CRC，前与接收到的CRC域中的值比较，如果两个CRC值不相等，则说明传输有错误。CRC是先存入0xFFFF，然后调用一个过程将帧中连续的6个以上字节与当前寄存器中的值进行处理。仅每个字符中的 8Bit 数据对CRC有效，起始位和停止位以及奇偶校验位均无效。CRC产生过程中，每个8位字符都单独和寄存器内容相异或(XOR)，结果向最低有效位方向移动，最高有效位以0填充。LSB 被提取出来检测，如果LSB为1，寄存器单独和预置的值相异或，如果LSB为0，则不进行。整个过程要重复8次。在最后一位（第8位）完成后，下一个8位字节又单独和寄存器的当前值相异或。最终寄存器中的值，是帧中所有的字节都执行之后的CRC值。例如，需要传输“11001110”，数据中含 5 个“1”，如果用偶校验，其偶校验位为“1”，如果用奇校验，其奇校验位为“ 0 ”，传输数据时，奇偶校验位经过计算放在帧的校验位的位置，接收设备也要进行奇偶校验，如果发现接受的数据的奇偶性与预置的不一致，就认为通讯发生了错误。CRC的这种计算方法，采用的是国际标准的 CRC校验法则，用户在编辑CRC算法时，可以参考相关标准的CRC算法，编写出真正符合要求的CRC计算程序。

标准：CRC-16/MODBUS
多项式：x16+x15+x2+1(0x8501)
CRC初始值：0xFFFF
现在提供一个 CRC 计算的简单函数给用户参考（用 C 语言编程）：

```
unsigned int crc_cal_value(unsigned char *data_value,unsigned char data_length)
{
int i;
unsigned int crc_value=0xffff;
while(data_length--)
{
crc_value^=*data_value++;
for(i=0;i<8;i++)
{
if(crc_value&0x0001)
crc_value=(crc_value>>1)^0xa001;
else
{
crc_value=crc_value>>1;
}
}
}
returncrc_value;
}
```

Modbus通信参数地址

控制命令输入到驱动器：(只写)

命令字地址	命令功能
0xE720	0001：运行
	0002：点动运行
	0004：减速停机
	0005：故障复位
	0006：速度反向
0xE721	Modbus通讯设定值1
0xE722	Modbus通讯设定值2

注：通讯设定值的取值范围为-600.0%~600.0%

8 EtherCAT协议

EtherCAT是一项高性能、低成本、应用简易、拓扑灵活的工业以太网技术，可用于工业现场级的超高速I/O网络，使用标准的以太网物理层，传输媒体双绞线或光纤(100Base-TX或100Base-FX)。借助于从站中的EtherCAT专用芯片和主站中读取网卡数据的DMA技术，整个协议处理过程都在硬件中进行。EtherCAT系统可以在30us内刷新1000个I/O点，它可以在300us内交换一帧多达1486个字节的协议数据，这几乎相当于12000个数字量输入或输出。控制100个输入输出数据均为8字节的驱动器只需要100us。在此期间，系统更新带有命令值和控制数据的所有轴的实际位置及状态，分布时钟技术使同步偏差小于1us。

EtherCAT通信状态机

状态机说明

状态	说明	SDO收发	PDO发送	PDO接收
Init	无邮箱及过程数据通信	×	×	×
Pre-Operational	应用层邮箱数据通信	√	×	×
Safe-Operational	支持邮箱数据通信			
	有过程数据通信，但只允许从站读入输入数据（发送TPDO），不产生输出信号（不接收RPDO）	√	√	×
Operational	SDO（邮箱）收发数据、PDO收发全部可行状态	√	√	√

状态转换说明

状态转换	说明
IP	主站配置从站站点地址寄存器
	配置邮箱通信参数
	配置DC时钟参数
	主站写状态控制寄存器，请求Pre-OP
PI	中断邮箱通信
PS	主站使用邮箱初始化过程数据映射
	主站配置过程数据通信使用的SM通道
	主站配置FMMU
	主站写状态控制器寄存器，请求Safe-Op
SP	终止更新输入
SO	主站发送有效的输出数据。
	主站请求OP状态
OS	终止更新输出PDO数据
OP	终止更新输入/输出PDO数据
SI	终止更新输入PDO及邮箱数据
OI	终止更新输入输出PDO及邮箱数据

EtherCAT通信数据传输

EtherCAT的CoE(CANopen over EtherCAT)服务类型包括:
1)紧急事件信息;
2)SDO请求;
3)SDO响应;
4)TxPDO;
5)RxPDO;
6)远程TxPDO发送请求;
7)远程RxPDO发送请求;
8)SDO信息。
在PLC编程中,可以使用EtherCAT库中特定的功能块进行SDO的读写操作,SDO的访问是通过索引(Index)和子索引(SubIndex)进行寻址。对于一些不支持PDO访问,或者上电后需要初始化的一些参数以及修改频率相对较低的一些参数可以使用SDO进行访问。

过程数据PDO:
PDO映射用于建立对象字典与PDO的映射关系。AD驱动器中PDO分配情况,如下表所示:

名称	索引	应用场景	映射数量	默认映射
RPDO1	0x1600	自定义PDO	8 Max/ 2 default	0x6040控制字0x6042目标速度
RPDO2	0x1701	COE_ VL模式	2 fixed	0x6040控制字0x6042目标速度
RPDO3	0x1702	普通通信模式	16 fixed	0x4000 R-PZD.1~16
TPDO1	0x1A00	自定义PDO	8 Max/ 2 default	0x6041状态字0x6044实际速度
TPDO2	0x1B01	COE_ VL模式	2 fixed	0x6041状态字0x6044实际速度
TPDO3	0x1B02	普通通信模式	16 fixed	0x4100 T-PZD.1~16

邮箱数据SDO:
SDO用于传输非周性数据,如通信参数的配置,驱动器参数配置等。

SDO终止码:
在SDO传输过程中,如果某一方发现错误,可以发起SDO终止传输请求,对方收到此请求后,停止当前SDO传输,SDO终止传输请求不需要应答。其中SDO数据有4个字节的终止代码,表示终止传输的具体原因,如下表所示:

序号	代码号	含义
1	0x05 03 00 00	分段传输时翻转位无变化
2	0x05 04 00 00	SDO传输超时
3	0x05 04 00 01	命令码无效或未知
4	0x05 04 00 05	内存溢出
5	0x06 01 00 00	不支持对某一对象的操作
6	0x06 01 00 01	读一个只写数据对象
7	0x06 01 00 02	写一个只读数据对象
8	0x06 02 00 00	数据对象在数据字典中不存在
9	0x06 04 00 41	数据对象不能映射到PDO中
10	0x06 04 00 42	要映射的数据对象的数量和长度超过了PDO数据长度
11	0x06 04 00 43	常规的参数不兼容
12	0x06 04 00 47	设备中常规内部不兼容
13	0x06 06 00 00	由于硬件错误导致操作失败
14	0x06 07 00 10	数据类型不匹配，服务参数长度不匹配
15	0x06 07 00 12	数据类型不匹配，服务参数长度过长
16	0x06 07 00 13	数据类型不匹配，服务参数长度过短
17	0x06 09 00 11	子索引不存在
18	0x06 09 00 30	写操作时，写入数据值超过范围
19	0x06 09 00 31	写入数据值太大
20	0x06 09 00 32	写入数据值太小
21	0x06 09 00 36	最大值小于最小值

AD_EC通信模式

AD_EC支持两种变频控制模式，分别为速度模式（COE_VL）和自定义模式（普通通信模式）。

◆速度模式（COE_VL）：

该模式下，通过0x6042设置目标速度，通过设置0x6040控制字，实现马达控制；

读取状态字0x6041和实际速度0x6044，获得当前马达状态。

控制字0x6040

索引 6040h	名称	控制字 control word			设定生效	运行设定立即生效	数据结构	VAR	数据类型	Uint16
	可访问性	RW	能否映射	RPDO	相关模式	ALL	数据范围	0-65535	出厂设定	0

设置控制指令：

BIT	名称		描述
0	off1 启停控制	Switch on	0-停机，0->1 运行
1	off2 惯性停机	Enable voltage	0-有效，1-无效
2	off3 快速停机	Quick stop	0-有效，1-无效
3	自定义运行允许来源	Enable operation	0-运行不允许，1-运行允许
4	斜坡函数发生器(RFG)禁止来源	operation mode specific	0-禁止有效，1-禁止无效
5	斜坡函数发生器(RFG)暂停来源	operation mode specific	0-暂停有效，1-暂停无效
6	斜坡函数发生器(RFG)给定置 0 来源	operation mode specific	0-给定 0 有效，1 给定 0 无效
7	自定义故障复位来源 1	fault reset	0-无效，1-有效
8	暂停	Halt	暂不支持
11	速度取反	ms-rd	0-无效，1-有效

注意：

控制字的每一个 BIT 位单独赋值无意义，必须与其他共同构成某一控制指令。

BIT8 暂不支持。

控制字值（二进制）	描述
xxxx xxxx x111 1110	初始开机准备（或 off1 停机）
xxxx 0xxx x111 1111	马达启动
xxxx 1xxx x111 1111	马达反向运行

目标速度0x6042

索引 6042h	名称	目标速度 vl target velocity			设定生效	运行设定立即生效	数据结构	VAR	数据类型	Uint16
	可访问性	RW	能否映射	RPDO	相关模式	ALL	数据范围	0-65535	出厂设定	0

该对象应指向系统所需的速度，该值应以用户定义的速度单位或每分钟转数（rpm）表示。

正值表示正向，负值表示反向。

状态字0x6041

索引 6041h	名称	状态字 status word			设定生效	-	数据结构	VAR	数据类型	UINT16
	可访问性	RO	能否映射	TP DO	相关模式	ALL	数据范围	-	出厂设定	0

反馈马达状态:

BIT	名称		描述
0	开机准备	Ready to switch on	0-未准备开机，1-准备开机
1	运行准备	Switch on	0-未准备运行，1-准备运行
2	运行	Operation enabled	0-未运行，1-运行
3	故障	Fault	0-无故障，1-有故障
4	Off2 停机有效	Voltage enabled	0-off2 有效，1-off2 无效
5	Off3 停机有效	Quick stop	0-off3 有效，1-off3 无效
6	开机封锁	Switch on disabled	0-未开机封锁，1-开机封锁
7	警告	Warning	0-无警告，1-有警告
9	控制权	Remote	0-远程控制，1-本地控制
10	速度到达	Target reach	0-速度未到达比较值，1-速度到达比较值
15	速度反向	Manufacturer speed direction	0-正向，1-反向

状态字值（二进制）	描述
xxxx xxxx x000 0000	驱动器未上电（或未进行 EtherCAT 连接）
xxxx xxxx x011 0001	开机准备（或 OFF1 停机）
xxxx xxxx x1xx xxxx	开机封锁
xxxx xxxx x011 0111	运行
xxxx xxxx x0xx 1xx1	故障（Fault）
xxxx 1xxx x011 0111	反向运行

实际速度0x6044

索引 6044h	名称	实际速度 vl velocity actual value			设定生效		数据结构	VAR	数据类型	Uint16
	可访问性	RO	能否映射	TP DO	相关模式	ALL	数据范围	0-65535	出厂设定	0

该对象应指向系统的实际速度。

◆自定义模式(普通通信模式)
该模式下,由用户自定义0x4000 R-PZD.1~16,来控制马达;
反馈的数据,由自定义反馈至0x4100 T-PZD.1~16。

索引	Mode	Object
0x4000	普通通信模式	R-PZD1
		R-PZD2
		R-PZD3
		R-PZD4
		R-PZD5
		R-PZD6
		R-PZD7
		R-PZD8
		R-PZD9
		R-PZD10
		R-PZD11
		R-PZD12
		R-PZD13
		R-PZD14
		R-PZD15
		R-PZD16
0x4100	普通通信模式	T-PZD1
		T-PZD2
		T-PZD3
		T-PZD4
		T-PZD5
		T-PZD6
		T-PZD7
		T-PZD8
		T-PZD9
		T-PZD10
		T-PZD11
		T-PZD12
		T-PZD13
		T-PZD14
		T-PZD15
		T-PZD16

注:此模式下选择博能控制器模块会自动互联相关参数。

ESI文件

请从博能传动官方网站下载，或联系厂家。

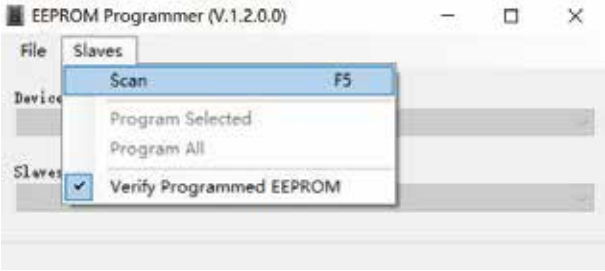
Boneng_AD_EC.xml是博能传动器的设备描述文件。

ESI是EtherCAT Slave Information的缩写，记载着从站固有的信息，如厂商信息，产品信息，对象字典，过程数据，同步模式，SyncManager设定等。

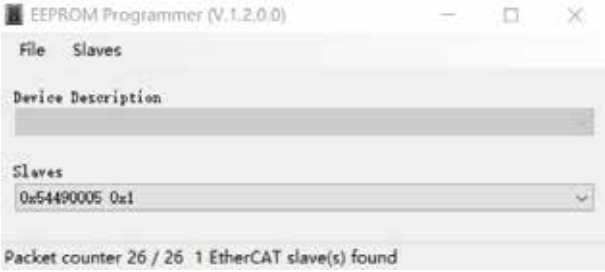
设备描述文件烧录：

双击打开EEPROM Programmer.exe程序，弹出新界面，如图

2.点击Slave选择Scan如图所示：

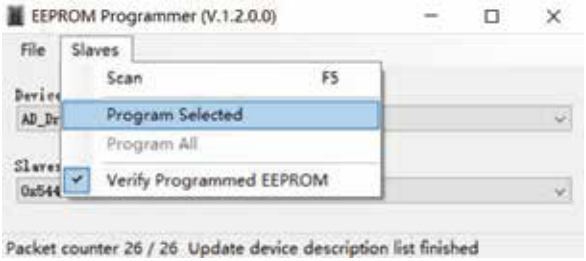


选择以太网



3.点击File 选择open 找到XML文件。如图：

4.在点击Slaves 选择 Program selected 就会进入烧写E^2中，如图：

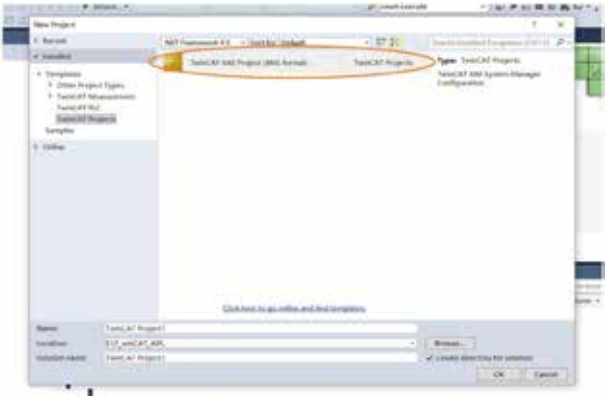


5.等待烧写完成，如图所示：

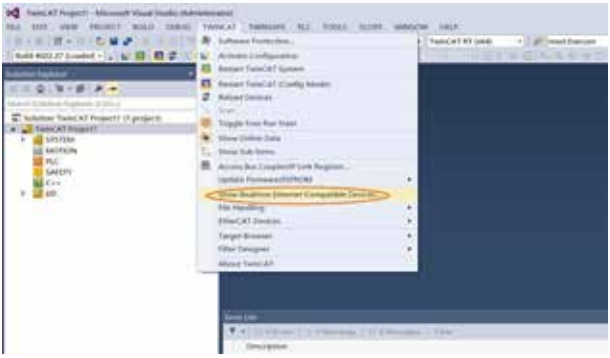
注：烧录过程中该软件会出现未响应状态，此状态是正常现象，无需做任何操作。

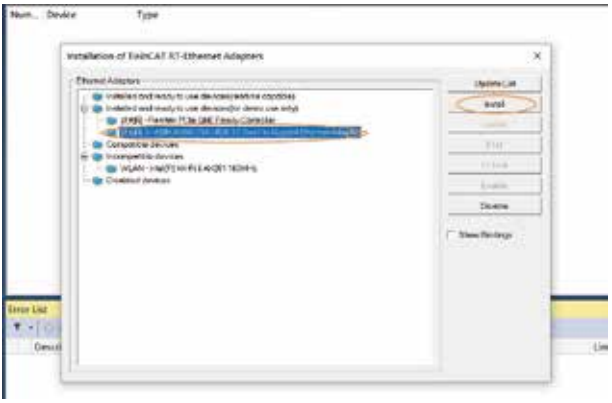
EtherCAT应用案例
配合倍福嵌入式控制器操作案例

本地连接
1. 安装TwinCAT软件。
2. 把Boneng_AD_EC配置文件（XML）复制到TwinCAT安装目录 ……
\TwinCAT\3.1\Config\Io\EtherCAT。
3. 打开TwinCAT3，新建一个工程如图。

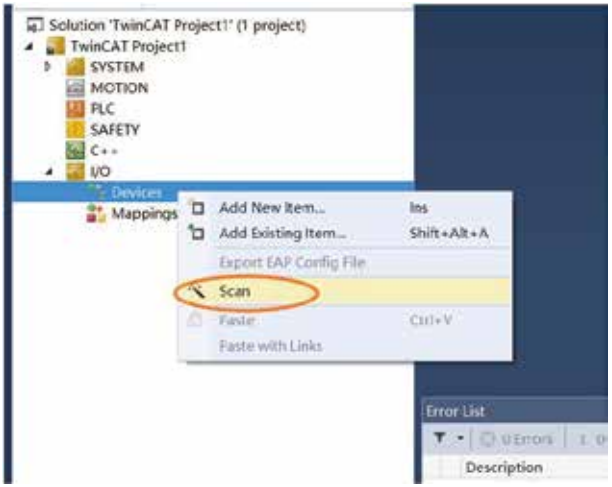


4. 安装TwinCAT网卡驱动
如图所示：

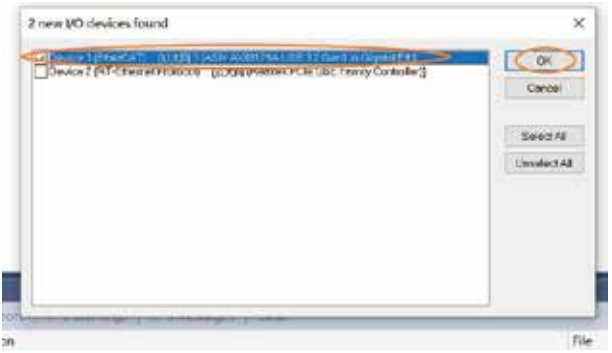




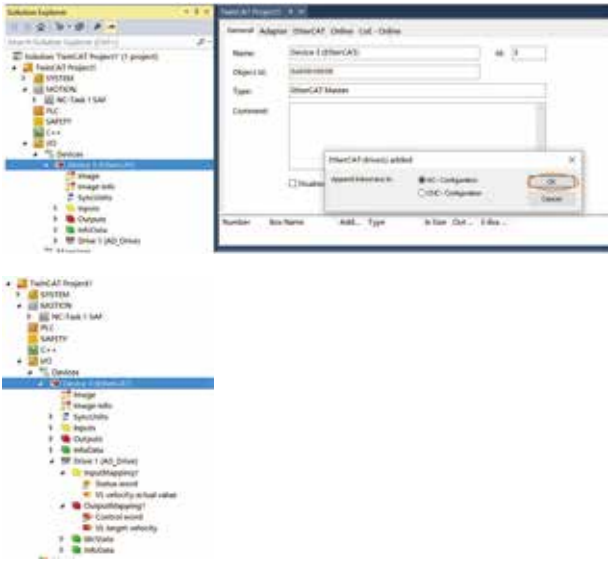
5.设备搜索


Solution 'TwinCAT Project1' (1 project)
TwinCAT Project1
SYSTEM
MOTION
PLC
SAFETY
C++
I/O
Devices
Mappings
Add New Item... Ins
Add Existing Item... Shift+Alt+A
Export EAP Config File
Scan
Paste Ctrl+V
Paste with Links
Error List
Description


Microsoft Visual Studio

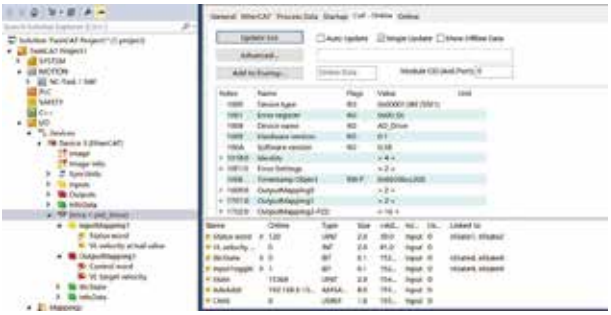

2 new I/O devices found
OK
Cancel
Select All
Unselect All


Microsoft Visual Studio
Scan for boxes
Clear

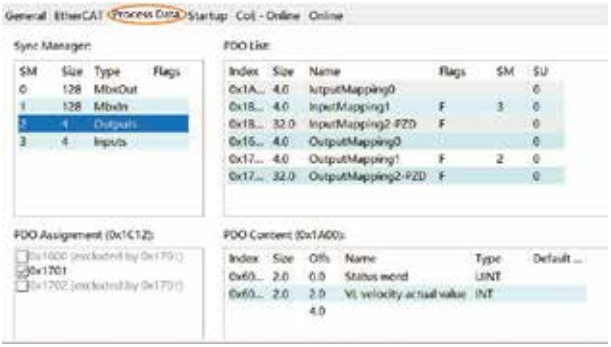


已成功添加设备

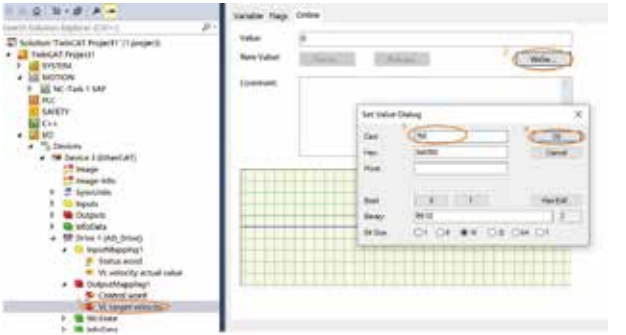
6.CoE-Online



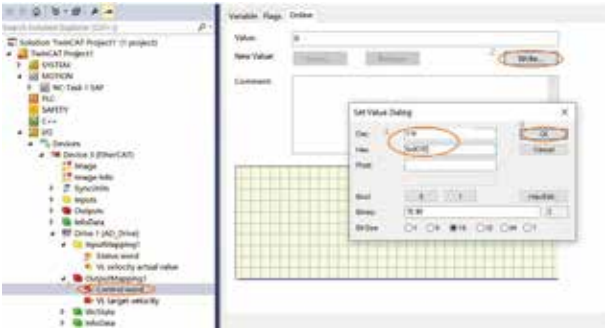
7.PDO配置



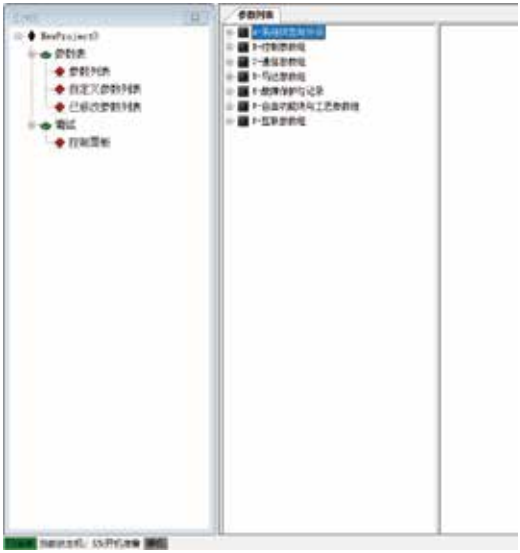
8.配置功能码参数（CoE_VL模式下）
设置C00.00总线适配器配套总线类型为5:EtherCAT；
A04.14驱动器驱动模式选择1:CoE_VL。
9.设置目标速度
这里设置目标速度为750rpm



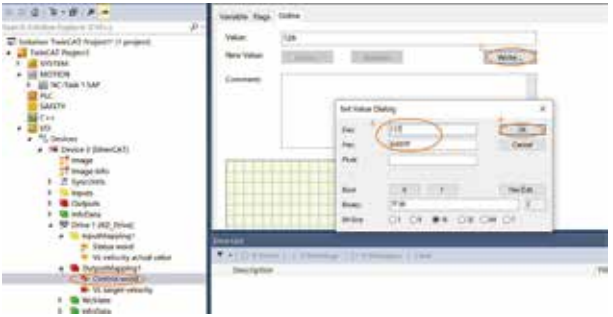
10.命令给定
1）初始化驱动器，控制字写入0x7E



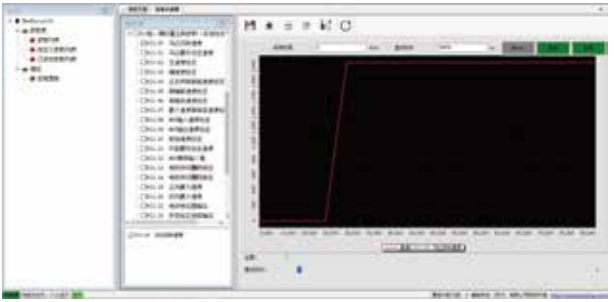
驱动器状态



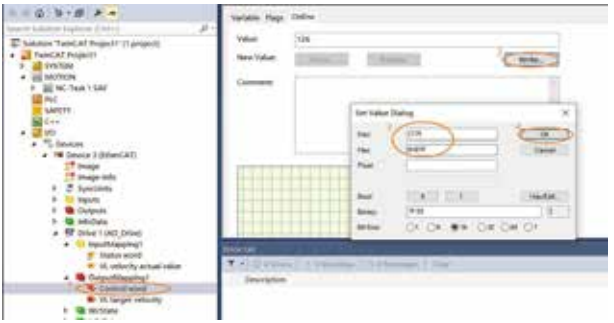
2) off1启动命令，控制字写入0x7F



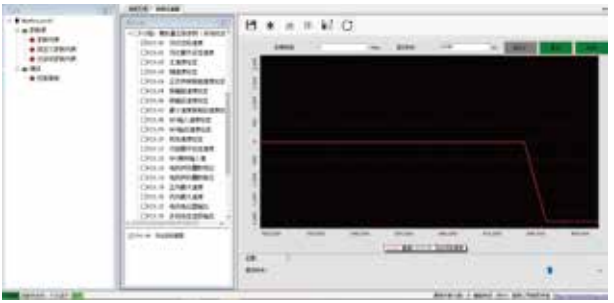
马达运行



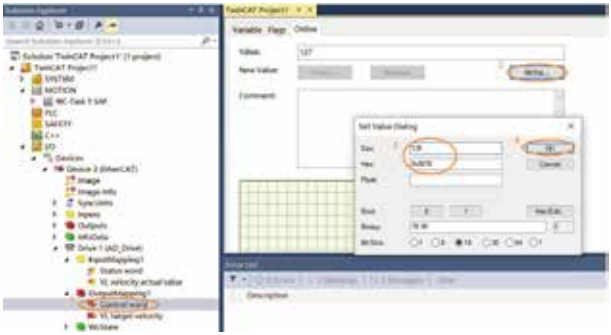
3) 反向运行指令，控制字写入0x87F



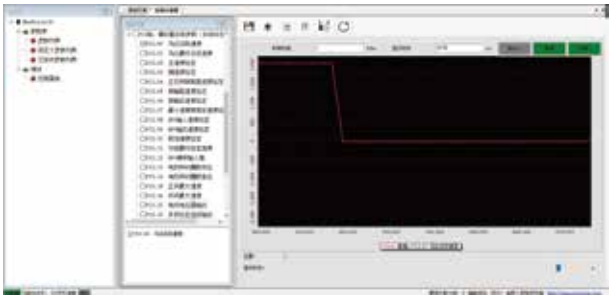
马达运行



4) 停止命令，控制字写入0x7E



马达停转



对象字典表

索引	对象名	访问权限	数据类型	单位	出厂值
0x1000	设备类型/Device type	RO/只读	U32	-	0x00010192
0x1001	错误寄存器/Error Register	RO/只读	U8	-	0
0x1008	产品名/Manufacturer device name	RO/只读	VS	-	"AD_Drive"
0x1009	硬件版本/hardware version	RO/只读	VS	-	*
0x100A	软件版本/software version	RO/只读	VS	-	*
0x1018	身份/Identity	RO/只读	-	-	4
--SI0	子条目数/Number of Entries	RO/只读	U8	-	0
0	制造商ID/Vendor ID	RO/只读	U32	-	0
0	产品号/Product code	RO/只读	U32	-	0
0	Reversion	RO/只读	U32	-	*
0	Serial number	RO/只读	U32	-	*
0x10F1	故障设置/Error Setting	RO/只读	-	-	0
--SI0	子条目数/Number of Entries	RO/只读	U8	-	0
0	本地异常触发/Local Error Reaction	RO/只读	U32	-	0
0	同步错误次数限制/Sync Error Counter Limit	RO/只读	U16	-	0
0x1600	输入映射0/Output Mapping 0			-	
--SI0	子条目数/Number of Entries	ro,wr_preop	U32	-	2
0		ro,wr_preop	U32	-	0x60400010
0		ro,wr_preop	U32	-	0x60420010
0x1701	输入映射1/Output Mapping 1			-	
--SI0	子条目数/Number of Entries	RO/只读	U8		2
0		RO/只读	U32	-	0x60400010
0		RO/只读	U32	-	0x60420010
0x1702	输入映射2/Output Mapping 2			-	
--SI0	子条目数/Number of Entries	RO/只读	U8	-	16
--SI1~SI16		RO/只读	U32	-	0x40000110~ 0x40001010
0x1A00	输出映射0/Input Mapping 0			-	
--SI0	子条目数/Number of Entries	ro,wr_preop	U32	-	2
0		ro,wr_preop	U32	-	0x60410010
0		ro,wr_preop	U32	-	0x60440010
0x1B01	输出映射1/Input Mapping 1			-	
--SI0	子条目数/Number of Entries	RO/只读	U8		2
0		RO/只读	U32	-	0x60410010
0		RO/只读	U32	-	0x60440010
0x1B02	输出映射2/Input Mapping 2			-	
--SI0	子条目数/Number of Entries	RO/只读	U8	-	16
--SI1~ SI16		RO/只读	U32	-	0x41000110~ 0x41001010
0x1C00	同步管理器通讯类型/Sync Manager communication type				

索引	对象名	访问权限	数据类型	单位	出厂值
--SI0	子条目数/Number of Entries	RO/只读	U8	-	4
0	Communication Type SM0	RO/只读	U32	-	1
0	Communication Type SM1	RO/只读	U32	-	2
0	Communication Type SM2	RO/只读	U32	-	3
0	Communication Type SM3	RO/只读	U32	-	4
0x1C12	同步管理器2过程数据对象设置/SM2 PDO assignment				
--SI0	子条目数/Number of Entries	RO/只读	U8	-	1
0	1st PDO Mapping object index	RO/只读	U16	-	1700h
0x1C13					
--SI0	子条目数/Number of Entries	RO/只读	U8	-	1
0	1st PDO Mapping object index	RO/只读	U16	-	1B00h
0x4000	R-PZD				
--SI0	子条目数/Number of Entries	RW/读写	U8	-	16
--SI1~ SI16	R-PZD1~ R-PZD16	RW/读写	U16	-	0
0x4100	T-PZD				
--SI0	子条目数/Number of Entries	RO/只读	U8	-	16
--SI1~ SI16	T-PZD1~ T-PZD16	RO/只读	U16	-	0
0x603F	异常码/Error code	RO/只读	UINT16	-	0x0000
0x6040	控制字/Control word	RW/读写	UINT16	-	0x0000
0x6041	状态字/Status word	RO/只读	UINT16	-	0x0000
0x6042	VL目标速度/VL target velocity	RW/读写	INT16	rpm	0x0000
0x6043	VL给定速度/VL velocity demand	RO/只读	INT16	rpm	0x0000
0x6044	VL实际速度/VL velocity actual value	RO/只读	INT16	rpm	0x0000
0x6046	VL速度上下限/VL velocity min max amount	RW/读写		rpm	
--SI0	子条目数/Number of Entries	RO/只读	U8	-	16
0	VL速度下限/VL velocity min amount	RW/读写	UINT32	rpm	0x00000000
0	VL速度上限/VL velocity max amount	RW/读写	UINT32	rpm	0x000005DC
0x6048	VL加速度/VL velocity acceleration				
--SI0	子条目数/Number of Entries	RO/只读	U8	-	16
0	速度间隔/Delta speed	RW/读写	UINT32	rpm	0x000005DC
0	时间间隔/Delta time	RW/读写	UINT16	s	0x0005
0x6049	VL减速度/VL velocity deceleration				
--SI0	子条目数/Number of Entries	RO/只读	U8	-	16
0	速度间隔/Delta speed	RW/读写	UINT32	rpm	0x000005DC
0	时间间隔/Delta time	RW/读写	UINT16	s	0x0005
0x604A	VL快速停机/VL velocity quick stop				
--SI0	子条目数/Number of Entries	RO/只读	U8	-	16
0	速度间隔/Delta speed	RW/读写	UINT32	rpm	0x000005DC
0	时间间隔/Delta time	RW/读写	UINT16	s	0x0005
0x605A	快速停机选项码/Quick stop option code	RW/读写	INT16	-	0x0001
0x605B	停机选项码/Shutdown option code	RW/读写	INT16	-	0x0001
0x6060	操作模式设定/Modes of operation	RO/只读	INT8	-	0x02
0x6061	Modes of operation display	RO/只读	INT8	-	0x02
0x6502	Supported drive mode	RO/只读	UINT32	-	0x00000002

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1 Safety notice

warning

Only qualified professionals can install, operate and maintain inspection.
Touching the charged part may cause damage to the person. If you want to check the equipment, please turn off the power supply first, before the led lamp goes out, the drive is still high, and do not touch the internal terminals and internal circuits.
Install in the appropriate environment, otherwise may be the problem of ventilation space shortage, cause the equipment to heat, produce smoke, trigger fire, thus cause personal injury.
The voltage of the addition of the each terminal can be only according to the voltage specified in the specification, otherwise it will cause fault or damage.
Correct wiring, otherwise it can cause damage or personal injury.

2 Installation and connection

2.1 Product information

2.1.1 Product type

MH100M4B22 H L 2 - D 0 MB 0 - 1 1 1

Position of the cable inlet hole[2)]
1/3

Junction box position[2)]
1/2/3/4

Mounting direction[1)]
1/2/3/4/5/6

Protection class
IP55 1=IP55+Rain shield

Communication protocol
MB=Modbus RTU
EC=EtherCAT

Speed control knob[3)]
0=Knob free 1=knobs

Driver
D=distributed

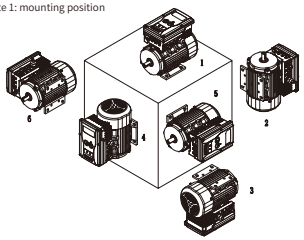
Frequency/voltage code
2=47~63Hz/380~480V

Base material
L=Aluminum base

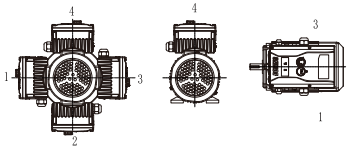
Installation form
H=B3 bottom corner installation
F=B5 flange mounting
S=B14B flange mounting

Power(kW)	MH=IE2 three-phase AC asynchronous motor 4 pole specification MP=IE3 three-phase AC asynchronous motor 4 pole specification
0.25	MH071M4A25 MP071M4A25
0.37	MH071M4A37 A37
	A55… MP080M4A55…
0.75	MH080M4A75… MP080M4A75…
1.1	MH090S4B11… MP090S4B11…
1.5	MH090S4B15… MP090M4 …
2.2	MH100M4B22… MP100M4B22
3	MH100M4B30… MP100M4B30…

Note 1: mounting position

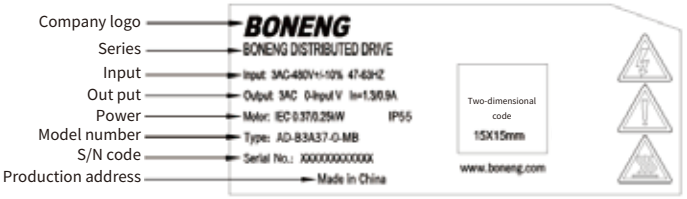


Note 2: position of cable connection and entry(view angle: motor tail of mounting position 1)



Note 3: Machine with optional knobs need to pay attention to the combination of installation direction and terminal box location. It is recommended that after the whole machine is installed, the knob is facing up or to the side and 10mm knob space is reserved.

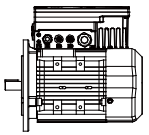
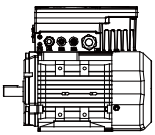
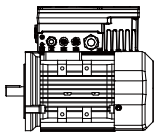
2.1.2 Product nameplate



2.2 Operation (installation) environment

Ambient temperature	-20℃~40℃
Relative humidity	-20℃≤T≤20℃： 100% 20℃＜T≤30℃： 95% 30℃＜T≤40℃： 55%
altitude	The altitude is not more than 1000m
Motor protection grade	The protection level is ip55
Motor insulation grade	The insulation system is designed at 155℃ (F) temperature scale, and the temperature grade is evaluated at 130℃(B).
Motor cooling mode	The motor standard cooling method is ic411 self-fan cooling

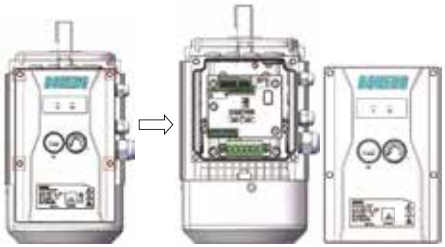
2.3 Installation mode

Basic structure type	The end cover of the equipment has a flange, and the equipment has no foot	The equipment has a foot, end cover without flange	The end cover of the equipment has a small flange, and the equipment has no foot
Number	80 ~ 100	80 ~ 100	80 ~ 100
Code name	B5	B3	B14B
Schematic diagram			

Cable connection mode, using the right end as an example.

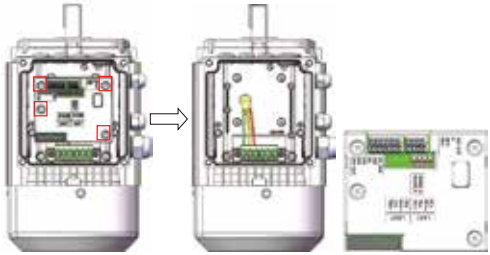
2.3.1 MB Cable Connection Mode

2.3.1.1 Loosen the four captive screws on the top cover and remove the power module from the device (note 3).

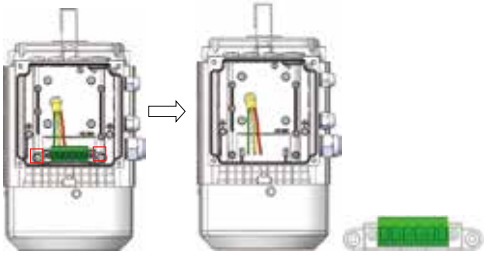


Note 3: When removing the power module, hold both ends of the power module and lift it horizontally.

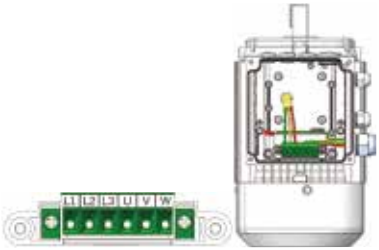
2.3.1.2 Loosen the four captive screws on the control module and remove the control module.



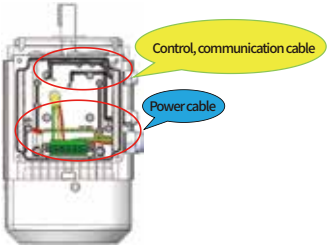
2.3.1.3 Loosen the two captive screws on the power terminal and remove the motor power cable and power terminal.



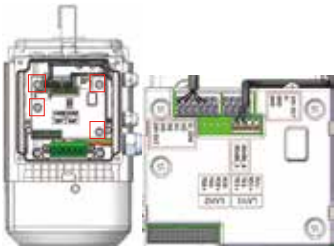
2.3.1.4 Connect the external power cable to the power terminal and connect the motor cable according to the text instructions on the terminal. Fixed power terminal, screw fastening torque 2.5Nm.



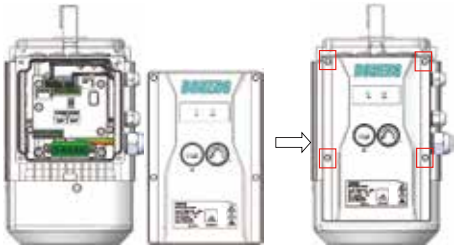
2.3.1.5 Connect DI and AI cables (for inlet X1), and MB communication cables (for inlet LAN1) to the LAN header as shown in the following figure. Do not cross control cables with power cables.



2.3.1.6 Installing the Controller Module, tighten the screws with a torque of 2.5Nm. Connect the corresponding cables according to the instructions on the plastic case.

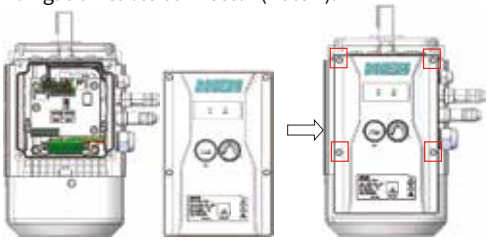


2.3.1.7 Installing the Power Module. Tighten the screws with a torque of 3.5Nm.



2.3.2 EC Cable Connection

The EC version is different from the MB version because the communication cable connection mode is different. The internal cables of the EC communication version are connected before delivery. You only need to insert the communication cables to a proper position according to the cable labels. Connect the external communication cables to the navigation cable connector (note 4).



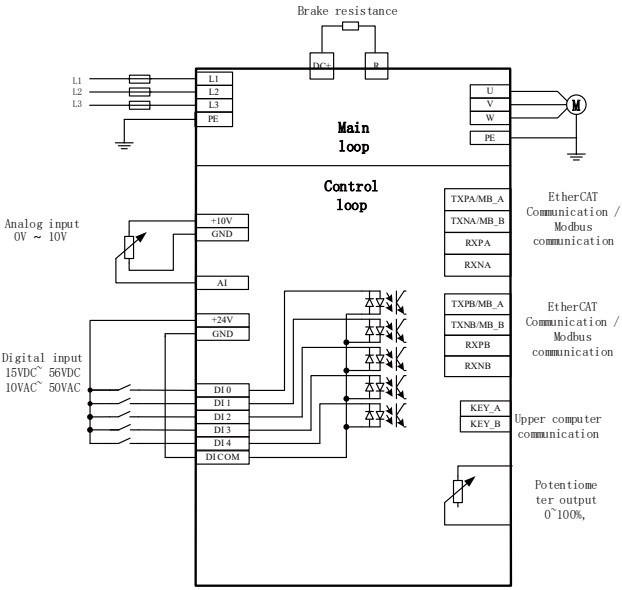
Note 4: The sequence of the navigation cable connector and the four-core network cable correspond to the following table:

1	2	3	4
green	Green and white	orange	Orange and white

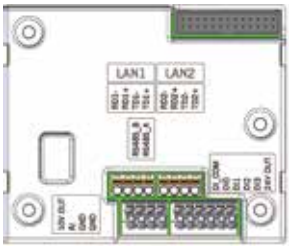
To fit the navigation plug, the cable must meet the following requirements for the Glen head and cavity temperature

classification	Temperature resistance ℃	Outer diameter mm	Shield
Power cable	> 90	10-17	
AI,DI cable	> 90	6-8	
MB communication cable	> 90	6-8	
EC communication cable		6-8	√

2.3.3 Terminal wiring diagram



Control terminal arrangement diagram is as follows:

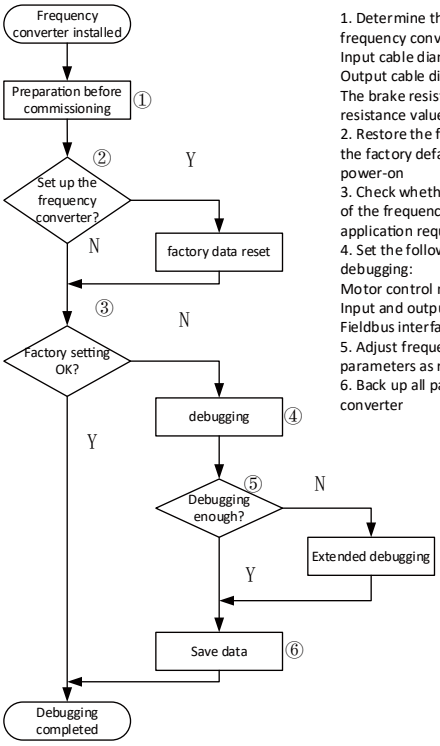


Function	connector	Description and overview	Technical data
Upper computer	KEY_A	RS_485 communication	Support communication with upper computer
	KEY_B		
Modbus communication	MB_A	RS_485 communication	Modbus-RTU is supported
	MB_B		Photocoupling isolation
EtherCAT communication	TXPA/TXPB	Ethernet communication	EtherCAT communication is supported
	TXNA/TXNB		
	RXPA/RXPB		
	RXNA/RXNB		
Output power	+10V	Digital output terminal +10V voltage	+11.7VDC ± 5% , max 20mA
	+24V	Digital output terminal +24V voltage	+24V±10%, max 200mA
Digital input	DI0	There are four DI inputs	Isolation voltage 2.5KV, compatible with bipolar input
	DI1		Less than 5V is low and more than 11V is high
	DI2		
	DI3		Support VAC 48V input
	DI_COM		
Analog input	AI	There is an AI input channel	Single-ended input
			Support voltage type 0 to 10V input
			Error ±1%

Note: When controlling the terminal external device, must pay attention to the terminal voltage, current specifications, so as not to damage the frequency converter.
Note 2: Control signal wiring requirements:
Analog signals: Shielded cables must be used. Twisted-pair double-shielded cables are recommended. Each analog signal occupies a twisted pair, and all shielding layers are twisted into a bundle and connected to PE.
Digital signal: choose with shielded cable, can also use unshielded twisted pair cable; Analog and digital signals are routed separately using different cables.

3 Debugging and operation

3.1 Debugging guide



1. Determine the application needs of frequency converters
Input cable diameter
Output cable diameter
The brake resistance matches the resistance value
2. Restore the frequency converter to the factory default value after the first power-on
3. Check whether the factory Settings of the frequency converter meet your application requirements
4. Set the following items during driver debugging:
Motor control mode
Input and output
Fieldbus interface
5. Adjust frequency converter parameters as required
6. Back up all parameters of the converter

After confirming that the frequency converter is correct, connect the motor for debugging. If the phase sequence of the motor power supply U1, V1, W1 is connected to the binding post U1, V1, W1 in turn, observe the rotating shaft from the drive end of the motor, and its rotation direction is clockwise. After the motor starts, pay attention to the display data of the motor, transmission device, production machinery and frequency converter panel. If there is any abnormal phenomenon, stop the motor immediately. After the fault is identified and removed, restart the motor.
The rotation direction of the motor can be changed by changing any two phases in the power line.

3.2 Preparation before commissioning

3.2.1 Collect motor data

Before you start debugging, you need to confirm the following:

◆which kind of motor drive connection?
Please record the product number of the motor and the data on the nameplate, and record the relevant motor parameters in the corresponding parameter list of the driver.

◆how to connect the motor?
Note the wiring of the motor (star [Y] or triangle [Δ]). Write down the motor data corresponding to the connection.

3.2.2 The factory Settings of the drive

Driver model setting
The driver has been configured to match the rated power of the power module before delivery.
Driver control
The driver control factory Settings signal comes from the terminal, the terminal factory Settings depend on the control module Settings.

X6:1	DI0	Forward running
X6:2	DI1	Reverse running
X6:3	DI2	... (No function)
X6:4	DI3	...

X3:1	AI0+	...
X3:2	AI0-	

Turn on and off the motor

In the driver's factory Settings, taking the frequency set value of 5Hz (rated frequency of the motor is 50Hz) as an example, the driver will accelerate the motor to this set value within 5 seconds after being switched on. Similarly, after turning off the motor, the driver also causes the motor to slow down and brake within 5 seconds。

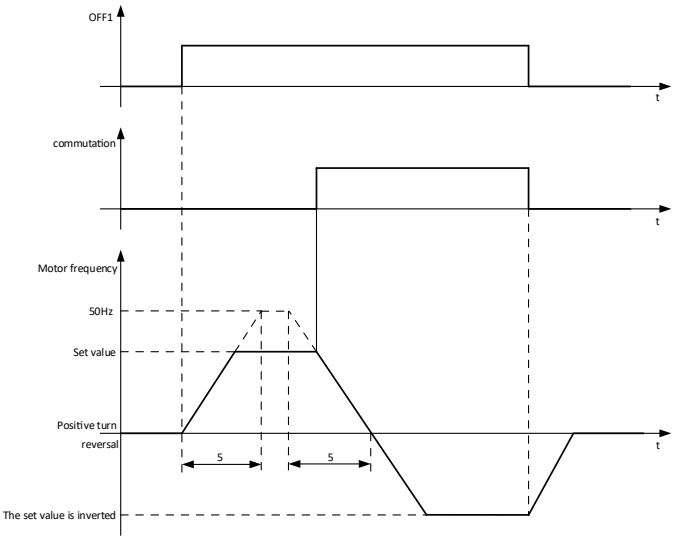


Figure 5-1 Opening, closing and reversing of the motor in factory Settings

3.3 Restore factory defaults

Some situations can cause debugging exceptions, such as:

◆power interruption during debugging, make debugging cannot end.

◆because don't understand the meaning of a parameter in the process of debugging and cannot continue.

◆you do not know if the drive has been used once.

Restore the drive to factory Settings in these cases.

Table 5-X Parameters are restored to factory defaults

parameter	Parameter name	description
A04.00	Parameter reset mode	0: void 1: Model parameters, motor parameters, fault records do not reset. 2: Motor parameters, failure record does not reset. 3: Full parameter reset. 4: Clearing fault records (Group E01~E06)
A04.01	Parameter reset	0: cancel 1: confirm

Model parameter：Driver Sets the power model parameters of the PM driver module.

Motor parameter：The parameters of the motor driven by the driver.

Example:

Target requirements: Restore factory defaults for parameters other than model parameters and motor parameters.

Steps:

1.A04.00=1;

2.A04.01=1;

Wait 5 seconds and the drive is restored to factory defaults.

3.4 Operation panel operation and display

Describes the operation and display interface

The operation panel can be used to modify the function parameters of the driver, monitor the working state of the driver, and control the operation of the driver (start, stop), etc. Its appearance and function area are shown in the figure below:

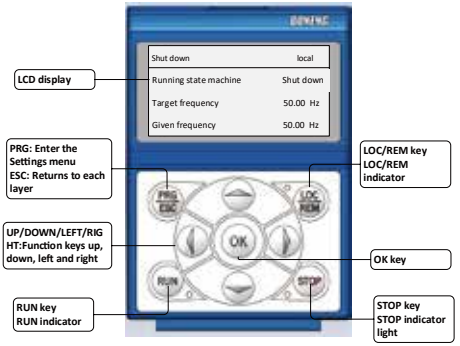


Figure 3-1 Schematic diagram of operation panel

1)Function indicator light indicator

LOC/REM Indicator light:If the indicator is on, the panel operation is controlled. If the indicator is off, the panel operation is controlled remotely.

STOP Indicator light:When the light is on, the drive is shut down.

RUN Indicator light:When the light is on, the driver processing status is running.

2)Operation panel key description

Table 3-1 Key function table of operation panel

key	Name	Function
PRG/ESC	Programming key/return key	In the main monitoring screen, press this key to enter the function selection screen. For other screens, press this key to return to the previous screen or status
LOC/REM	Local/remote key	Gain or relinquish keyboard control
STOP	stop key	In running state, press this key to stop running operation; In the shutdown state, press this key to reset the fault state
RUN	Run key	In keyboard mode, it is used to run operations
	Increment key	Increment of data or function code
	Descending key	Decrement of data or function code
	Right shift key	When modifying a parameter, you can iterate to the right to select the modification bit of the parameter
	Left shift key	When modifying a parameter, you can iterate to the left to select the change bit of the parameter
OK	Confirm key	Enter the menu screen step by step, set parameters to confirm

3)LCD interface description

The LCD displays 4 lines of Chinese characters, among which the first line displays the behavior status. When there is no fault, display the current running status (stop/running), click control, local/remote status and other information. When a fault occurs, the current fault code is displayed in the first line, as shown in the following figure:

Shut down	local
Running state machine	Shut down
Target frequency	50.00 Hz
Given frequency	50.00 Hz

Figure 2 Normal LCD display example

Fault: frequency converter overtemperature 1	
Running state machine	Shut down
Target frequency	50.00 Hz
Given frequency	50.00 Hz

Figure 3 LCD display example of fault status

This section describes how to view and modify function codes

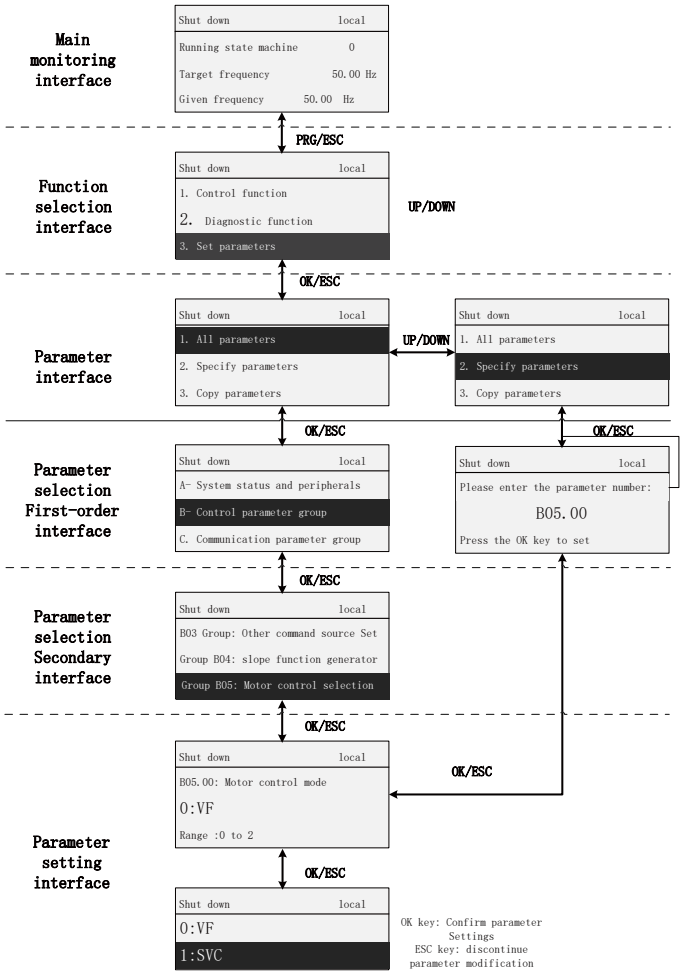
The driver's operation panel adopts multi-level menu structure for parameter setting and other operations. The interface adopts 4 lines of Chinese display, which is very intuitive and easy to operate.

On the parameter setting screen, press the up and down buttons to view the function codes in turn. Press the OK key to enter the parameter setting screen.。

Example: Change function code B05.00 from VF control to SVC control, as shown in the following figure.

The result of the parameter setting is one of the following:

1) The modification is successful
2) Read-only parameter
3) No permission to modify
4) Can only stop for modification



Select monitoring parameters on the home screen

The number of parameters that can be monitored on the home screen is six, ranging from A00.00 to A00.16 (17 parameters in total). Set parameters A00.41 to A00.46 on the main monitoring screen.

For example, if A00.14(DC bus voltage) needs to be displayed on the second line of the main monitoring screen, you only need to change the value of A00.42 to 14.

4 Extension debugging

4.1 Driver function overview

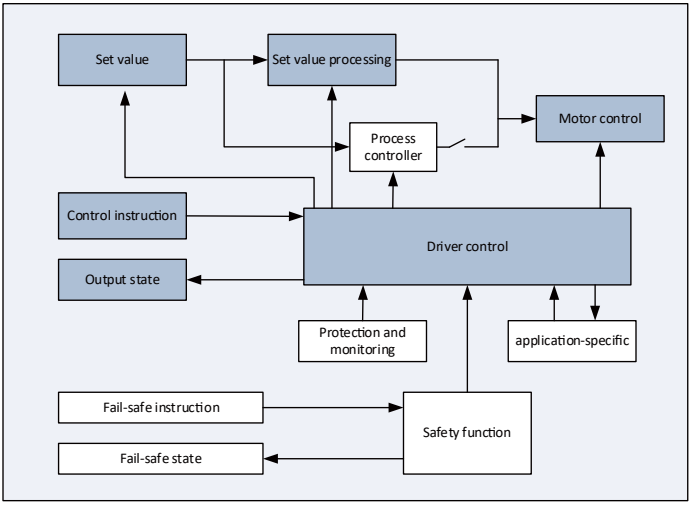


Figure 4-1 Driver functions

Common function		Special function	
The functionality required under each application is shown in dark color in the Feature list above. Please set these functions properly during		The functions whose parameters need to be adjusted are shown in white in the Function list above.	
Driver control	The permissions of the drive control override all other functions that define how the drive responds to instructions from the superior controller		Protection and monitoring features prevent damage to motors, drivers and working machinery, such as through temperature monitoring or torque monitoring.
Instruction output state	Instructions from the superior controller are sent to the driver through digital input or fieldbus. The driver feeds its status information to the control module output or to the field bus.	application	Application specific functions can be controlled such as motor lock, or enable upper pressure control or temperature control via process controller.
Set value	A set value must be determined, such as the speed set	Safety function	The security function is used to secure the driver function Required application.Basic function safety lock drive torque。
Set value processing	Set value processing is used to avoid sharp changes in the speed caused by the ramp function generator and to keep the speed below the maximum.		
Motor control	Motor control is used to allow the motor to track speed Settings. You can control vectors and V/f Choose between controls.		

4.2 Driver control

4.2.1 Turn on and off the motor

After switching on the power voltage, the driver usually enters the "boot ready" state. In this state, the driver will be waiting for the motor's instructions:

◆receive OFF1 - OFF

After the command, the drive will switch on the motor. The drive enters the Running state.

◆Send OFF1-OFF

After the command, the driver brakes the motor. After the motor stops, the driver will turn off the output. The drive returns to the Ready for Startup state.

Drive status and instructions for turning on and off the motor

In addition to the OFF1 instruction, the instructions to stop the motor are:

◆OFF2 -ON The driver stops output immediately without braking the motor first.

◆OFF3 -ON The directive means "emergency stop." After issuing the OFF3-on command, the driver braking the motor with the OFF3 deceleration time. After the motor stops, the driver will turn off the output.

This command is often used in abnormal operation to make the motor brake quickly. Typical applications are collision protection。

◆Suspended operation - drive to OFF1 OFF2 / OFF3 stop way to stop the motor running.

◆Nnormal operation - drive drive motor running.

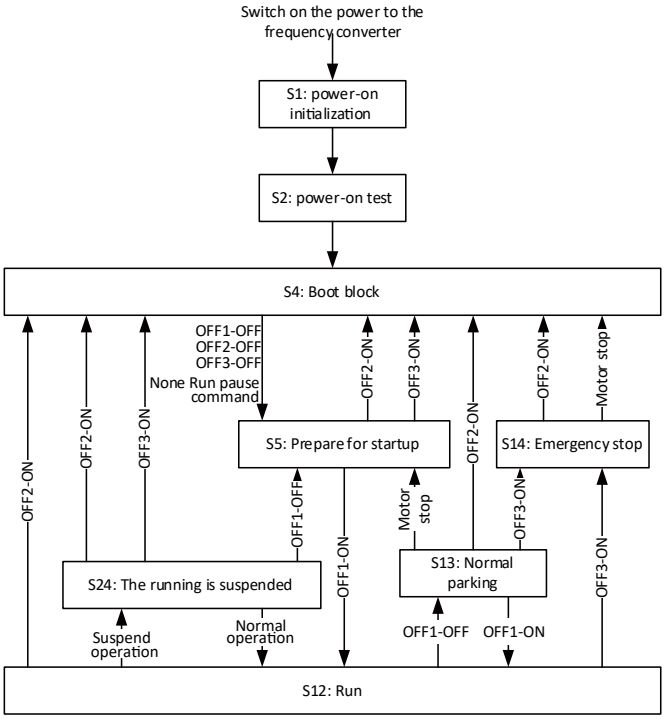


Figure 4-2 Internal sequence control of the driver when the motor is turned on and off

Drive status description table:

Drive status	description
S1	The initial state of the drive after it is powered on
S2	The status of power device detection after driver initialization
S4	The state in which the drive does not meet the operating conditions of the motor
S5	The state in which the drive meets the operating conditions of the motor
S12	The driver output makes the motor run
S13	The motor has been shut down by the OFF1 instruction and stopped during the ramp function generator's ramp down time.
S14	The motor has been shut down by OFF3 instruction and retarded at OFF3 reduction time or according to current limit.
S24	The motor is suspended

4.2.2 Adjust terminal block Settings

This section describes how to modify the digital and analog input functions of the drive.

Digital input

Modify the function of numeric input

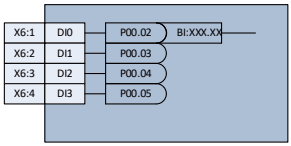


Figure 4-3 Digital input function diagram

Note:The DI function can be modified only after the DI status parameter is connected to the selected binary interconnection input.

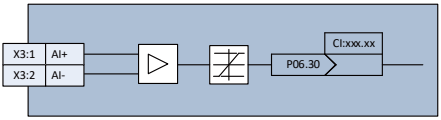
Table 4-1 Input parameters for binary interconnection of some common drivers

BI	meaning	BI	meaning
B00.01	Customizing OFF1 sources	B03.12	Multi-segment given value selection1
B00.02	Customized OFF2 source 1	B03.13	Multi-segment given value selection2
B00.13	Fault reset source	B03.14	Multi-segment given value selection3
B01.01	Start-stop control command mode	B04.00	RFG Ramp Time Selection 1
B01.03	Start-stop command input IN1	B04.01	RFG Ramp Time Selection 2
B01.04	Start-stop command input IN2	E00.00	External Fault 1 Source
B01.05	Start-stop command input IN3	F03.00	Valid signals for PID function
B03.09	Motorized potentiometers increase source selection	F03.01	PID operation enable signal
B03.10	Motorized potentiometers reduce source selection		

Example: Modify the function of numeric input

Connect the external fault source selection (E00.00) to DI0, and enter DI0 with a number to trigger the external fault. Set the interconnection parameter of E00.00 to P00.02.
Note: The code rule of the interconnection parameter's representative number is agreed to be parameter number +1000; That is, P00.02 is numbered 1002; The number of P13.11 is 2311; The number of P15.89 is 2589; Other interconnection parameters are similar。

Analog input overview



Change the function of the analog input:
Use parameter A07.04 to determine the input signal type of the analog quantity.

Determine the type of analog input

A07.04	AI Input type	1：0~10V

Characteristic curve

The driver automatically adjusts the scale of the analog input based on the type of analog input. A linear scaling curve is defined by two points. Parameters A07.06 to A07.09 correspond to the AI analog input.

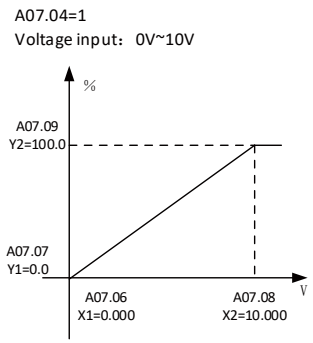


Figure 4-4 Calibration characteristic curve

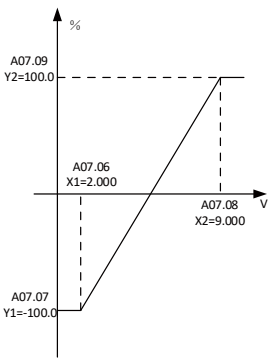
Parameter number	Parameter name	Parameter setting range
A07.06	Minimum input value of AI curve	00.000 ~ 10.000
A07.07	AI curve minimum input ratio	-600.0% ~ 600.0%
A07.08	Maximum input value of AI curve	00.000 ~ 10.000
A07.09	AI curve maximum input ratio	-600.0% ~ 600.0%

Adjusting characteristic curve

If the predefined type does not match your application, you need to customize the scaling curve.

Modification example

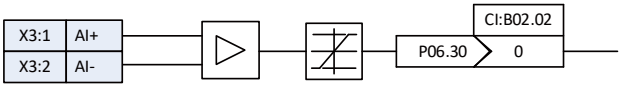
The driver should pass the AI to "2V... The signal in the 9V "range is converted to" -100 %... The value is in the 100 % "range.



Set the following parameters to set the analog input to the current input with monitoring:

1.Set A07.06=2.000(X1)
2.Set A07.07=-100.0(Y1)
3.Set A07.08=9.000(X2)
4.Set A07.09=100.0(Y2)

Determine the function of analog input - example



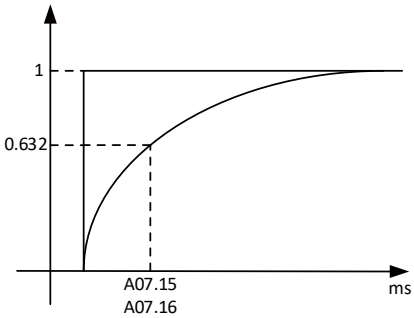
AI is connected to a signal source with a given additional speed to input AI with a given additional speed through analog quantity.

Set the interconnection parameter of B02.02 to P06.30.

Advanced Settings

Smooth filtering of signals

If necessary, you can use parameter A07.15 or A07.16 to smooth the signal read through the analog input.



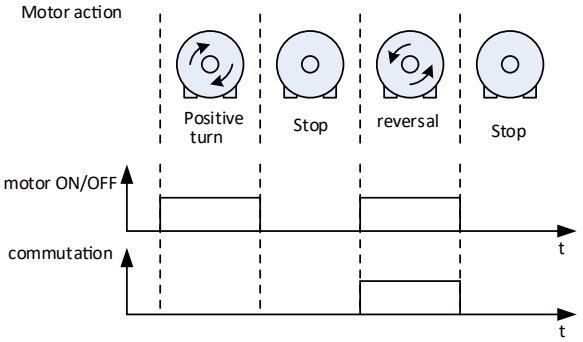
4.2.3 The drive is controlled by digital input (DI)

There are six ways to control a motor through digital input.

Single wire control

Single-wire control. The input terminal only controls the start and stop of the motor. The rotation direction of the motor is determined by the current driver output terminal connection phase sequence。

Two-wire control, Method 1



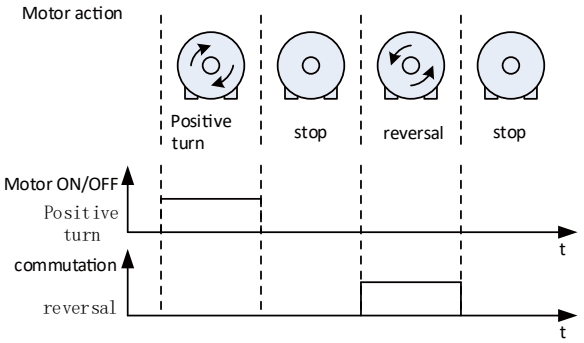
Control instruction

1. Switch ON and off the motor (ON/OFF1).
2. Switch motor rotation direction (reverse).

Typical applications:

Field control of conveyor belt applications.

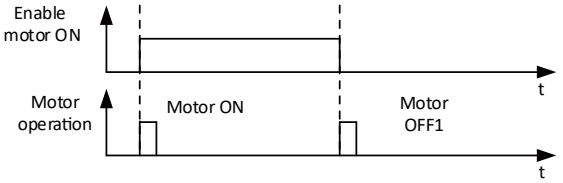
Two-wire control, Method 2



Control instruction
1. Switch ON and off motor (ON/OFF1) and turn forward.
2. Switch ON and off the motor (ON/OFF1) and reverse.

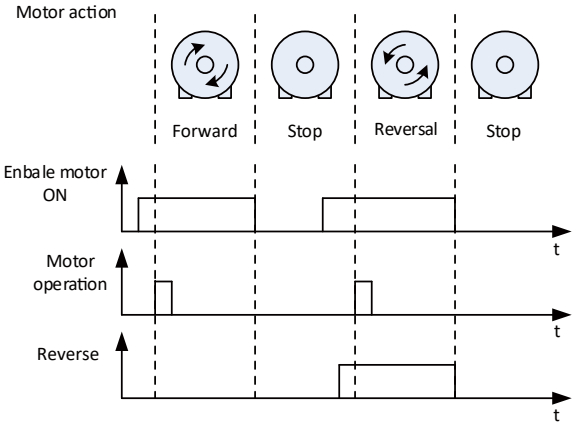
Typical application
Operating drive controlled by master switch.

Two-line control, method 3



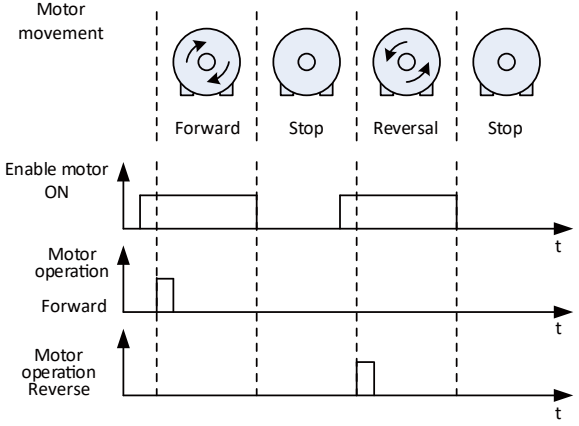
Control instruction:
1. Enable motor and turn motor off (OFF1).
2. Switch ON the motor (ON), the direction of rotation of the motor is determined by the current driver output terminal wiring phase sequence.

Three-wire control, Method 1



Control instruction:
1. Enable motor and turn motor off (OFF1).
2. Turn ON the motor (ON).
3. Switch motor rotation direction (reverse).

Three-wire control, Method 2



Control instruction:
1. Enable motor and turn motor off (OFF1).
2. The motor is running ON, on.
3. Motor operation reverse instruction (ON), reverse.

Typical applications:
Operating drive controlled by master switch.

4.2.4 Dual-wire control, Method 1

In this control method, you control the start and stop of the motor through one control instruction (ON/OFF1) and another control finger make the positive and reverse control of the motor.

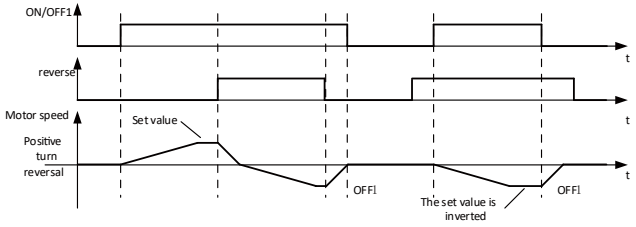


Figure 4-5 Dual-wire control Method 1

Table 4-2 terminal functions

ON/OFF1(IN1)	Reverse(IN2)	Function
0	0	OFF1：Motor stop
0	1	OFF1：Motor stop
1	0	ON：Motor forward
1	1	ON：Motor reversal

Relevant parameter setting

Parameter number	Parameter name	Parameter description
B01.01	Start-stop control command mode	Setting B01.01 = 2 indicates two-wire control: Method 1.
B01.03	Start-stop command input IN1	Input terminal source selection, this parameter is a binary interconnect parameter.
B01.04	Start-stop command input IN2	Input terminal source selection, this parameter is a binary interconnection parameter.

4.2.5 Two-wire control, Method 2

In this control method, the first control instruction (ON/OFF1).It is used to switch on and off the motor, and simultaneously select the positive rotation of the motor.
The second control instruction is also used to turn the motor on and off, while selecting the motor's Reverse turn.
The driver receives new instructions only when the motor is stationary.

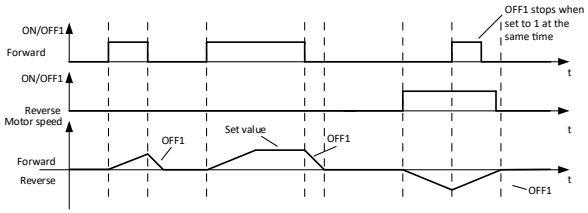


Figure 4-6 Dual-wire control method 2

Table 4-3 Function lists

ON/OFF1 Forward(IN1)	ON/OFF1 Reverse(IN2)	Function
0	0	OFF1：Motor stop
1	0	ON：Motor forward
0	1	ON：Motor reversal
1	1	OFF1：Motor stop

Relevant parameter table

Parameter number	Parameter name	Parameter description
B01.01	Start-stop control command mode	Set B01.01 = 3 for two-wire control: method 2.
B01.03	Start-stop command input IN1	Input terminal source selection, this parameter is a binary interconnect parameter.
B01.04	Start-stop command input IN2	Input terminal source selection, this parameter is a binary interconnect parameter.

4.2.6 Two-wire control, Method 3

In this control method, the first control instruction is used to enable another control instruction.
After disabling, the motor shuts off (OFF1).
The rising edge of the second control instruction will run the motor; The running direction of the motor depends on the phase sequence of the driver output.

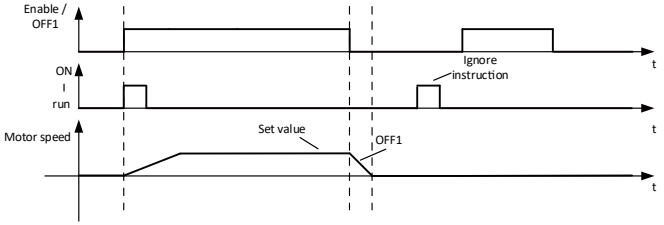


Figure 4-7 Dual-wire control method 3

Table 4-4 Function lists

Enable/OFF1(IN2)	ON/OFF1(IN1)	Function
0	0	OFF1：Motor stop
0	0->1	OFF1：Motor stop
1	0	OFF1：Motor stop
1	0->1	ON：Motor rotation, the direction of the drive output line wiring phase sequence shall prevail

Relevant parameter table

Parameter number	Parameter name	Parameter description
B01.01	Start-stop control command mode	Set B01.01 = 4 for two-wire control: method 3.
B01.03	Start-stop command input IN1	Input terminal source selection, this parameter is a binary interconnect parameter.
B01.04	Start-stop command input IN2	Input terminal source selection, this parameter is a binary interconnect parameter.

4.2.7 Three-wire control, Method 1

In this control method, the first control instruction is used to enable the other two control instructions.
After disabling, the motor shuts off (OFF1).
The rising edge of the second control instruction connects the motor (ON).
The third control instruction determines the direction of rotation (reversing) of the motor.

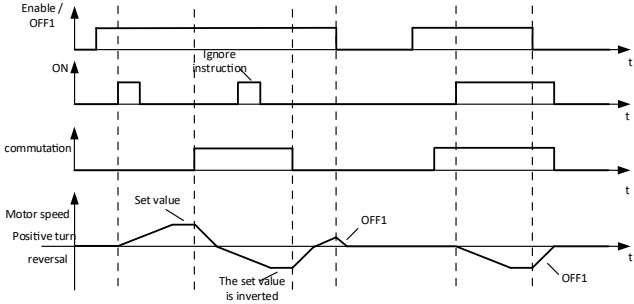


Figure 4-8 Three-wire control system Method 1

Table 4-5 Function lists

Enable/OFF1(IN2)	ON(IN1)	Reveral(IN3)	Function
0	0or 1	0or 1	OFF1：Motor stop
1	0->1	0	ON：Motor Forward
1	0->1	1	ON：Motor Reversal

Relevant parameter table

Parameter number	Parameter name	Parameter description
B01.01	Start-stop control command mode	Set B01.01=5 to indicate three wire control: Method 1.
B01.03	Start-stop command input IN1	Input terminal source selection, this parameter is a binary interconnect parameter.
B01.04	Start-stop command input IN2	Input terminal source selection, this parameter is a binary interconnect parameter.
B01.05	Start-stop command input IN3	Input terminal source selection, this parameter is a binary interconnect parameter.

4.2.8 Three-wire control, Method 2

In this control method, the first control instruction is used to enable two other control instructions.The motor is closed at (the) (off) for the cancellation.The second control command increases the motor to switch the motor to the right direction. If the motor is in an unconnected state, the motor is connected.The third control instruction increases the motor switch to reverse. If the motor is in an unconnected state, the motor is connected.

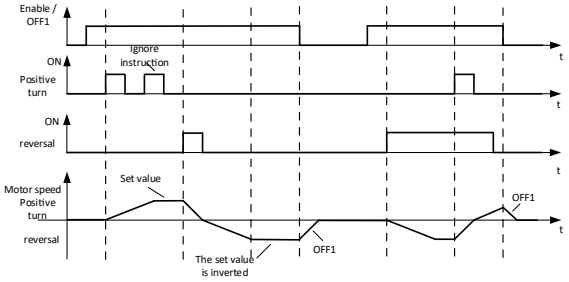


Figure 4-9 Three-wire control Method 2

Table 4-6 Function lists

Enable/OFF1(IN3)	ON Forward(IN1)	ON Reversal(IN2)	Function
0	0or1	0or1	OFF1：Motor stop
1	0->1	0	ON：Motor Forward
1	0	0->1	ON：Motor Reversal
1	1	1	Motor does not change

Relevant parameter table

Parameter number	Parameter name	Parameter description
B01.01	Start-stop control command mode	Set B01.01=6 to indicate three wire control, method 2.
B01.03	Start-stop command input IN1	Input terminal source selection, this parameter is a binary interconnect parameter.
B01.04	Start-stop command input IN2	Input terminal source selection, this parameter is a binary interconnect parameter.
B01.05	Start-stop command input IN3	Input terminal source selection, this parameter is a binary interconnect parameter.

4.2.9 Motor inching(JOG function)

The "JOG" function is usually used to move a mechanical part slowly, for example, a conveyor belt.
The motor can be switched on and off by digital input through the "JOG" function. After switching on, the motor will accelerate to JOG
Set the value. The drive provides two JOG sets, such as the forward motor set and the reverse motor set.
JOG acceleration and deceleration times are different from those of the ON/OFF1 instruction and are set by a separate parameter.

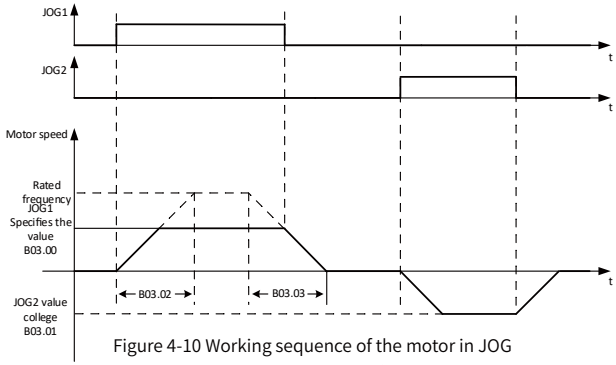


Figure 4-10 Working sequence of the motor in JOG

Note:The drive should be in the boot ready state before giving the "JOG" control command. The "JOG" instruction will not take effect if the motor is running.

JOG sets related parameters

Parameter number	Parameter name	Parameter description
B00.00	Source of start/stop control commands	Select the control command source module
B00.07	Custom JOG1 source	Custom control module JOG1 command source Settings
B00.08	Customize the JOG2 source	User-defined source of the JOG2 command for the control module
B01.11	Source of the terminal control module JOG1	Source of the JOG1 command of the terminal control module
B01.12	JOG2 Source of the terminal control module	Source of the JOG2 command of the terminal control module
B03.00	JOG1 Indicates the setting	JOG1 Set source selection
B03.01	JOG2 Indicates the setting	JOG2 Specifies the source of the value
B03.02	JOG acceleration time	JOG point dynamic acceleration time setting
B03.03	JOG deceleration time	JOG point dynamic deceleration time setting

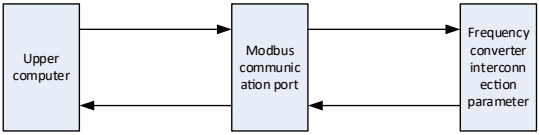
4.2.10 Communication control

Currently the drive supports Modbus communication and EtherCAT communication. Configure the corresponding bus type in C00.00 before communication.

Modbus communication control

For details about Modbus communication protocols, see Appendix.

The structure of Modbus communication is as follows:



Address of Modbus communication:

Communication address	name	definition
0xE720	Modbus Communication control command	1: start; 2: inching; 4: Slow down and stop; 5: fault reset; 6: The speed is reversed
0xE721	Modbus communication setting 1	Modbus communication setting value; Setting range: - 600.0% ~ 600.0%
0xE722	Modbus communication setting 2	Modbus communication setting value; Setting range: - 600.0% ~ 600.0%

Modbus communication parameters:

Parameter label	Parameter name	Parameter setting range
C00.00	Bus adapter Matching bus type	0:none 1:Modbus 5:EtherCAT
C02.00	Modbus Baud rate	0:2400bps 1:4800bps 2:9600bps 3:19200bps 4:38400bps 5:57600bps 6:115200bps
C02.01	Modbus data format	0: Parity check (8-E-1) 1: odd check (8-O-1) 2: No check (8-N-2) 3: No check (8-N-1)
C02.02	Modbus Local address	1~247
C02.03	Modbus Response delay	0~20ms
C02.04	Modbus Communication timeout	0: void，0.1s~60.0s
C02.06	Modbus communication setpoint unit selection	0: percentage 1: frequency
C02.07	Modbus Write function code to update non-volatile storage	0: update 1: Do not update
P02.32	ModbusCommunication start stop command	0~1
P02.33	Modbus Communication inching start-stop	0~1
P02.35	Modbus Communication fault reset	0~1
P07.32	Modbus Control command	0~65535
P07.33	Modbus Communication set value 1	-32768~32767
P07.34	Modbus Communication set value 2	-32768~32767
P07.35	ModbusCommunication set value 1 per unit value	0~65535
P07.36	Modbus Communication set value 2 per unit value	0~65535

Note: C02.04: Timeout for Modbus communication, which indicates the maximum interval between two consecutive modbus communications. Single communication C02.04 Set to 0: invalid.

Modbus operation instructions:
Before using C00.00, set C00.00 to 1:Modbus, set C02 parameters related to Modbus communication as required, and associate parameters according to the following table

Parameter label	name	Parameter setting
B00.00	Start/stop control command source	1：User-defined control module
B00.01	Custom 0FF1 source	Interconnection parameters: P02.32Modbus Start/Stop command
B00.05	User-defined fault reset source 1	Interconnection parameters: P02.35 The Modbus fault resets
B00.06	Custom speed command takes reverse source	Interconnection parameters: P02.36Modbus reverse command
B00.07	Custom JOG1 source	Interconnection parameters: P02.33Modbus inching Start Stop
B02.00	Speed control main setting selection	Interconnection parameter: per unit value for Modbus communication Settings

After that, communication is conducted according to the Modbus communication protocol (see Appendix for details).

Modbus Operation example：
C02.04 Communication timeout Set to 0: The parameters to be connected are invalid. Other parameters are set according to factory defaults.
Set target speed

Target velocity	Modbus-RTU Request frame	P07.33 Parameter value
100%	01 06 E7 21 03 E8 EF CA	1000
50%	01 06 E7 21 01 F4 EF 63	500
0%	01 06 E7 21 00 00 EF 74	0
-50%	01 06 E7 21 FE 0C AF 11	-500
-100%	01 06 E7 21 FC 18 AE 7E	-1000

Command setting
If you change the P07.32 parameter values, the system automatically updates the P02.32 to P02.35 parameter values

command	Modbus-RTU Request frame	P07.32 Parameter value	Other parameter changes
Start command	01 06 E7 20 00 01 7F 74	1	P02.32=1
Inching start	01 06 E7 20 00 02 3F 75	2	P02.33=1
Slow down stop	01 06 E7 20 00 04 BF 77	4	P02.32=0
Fault reset	01 06 E7 20 00 05 7E B7	5	P02.35=1
Reverse velocity	01 06 E7 20 00 06 3E B6	6	P02.36=1

Note:
The motor needs a rising edge signal to start. If the motor does not turn, you can start 01 06 E7 20 00 00 BE B4
After reverse operation, send a startup command message and switch to forward operation

EtherCAT communication control
For details about EtherCAT communication protocols, see the appendix.

EtherCAT communication parameters:

Parameter label	Parameter name	Parameter setting range
A04.14	Driver mode selection	0: indicates the common communication mode 1: CoE_VL mode
C00.00	Bus adapter Matching bus type	0:none 1:Modbus 5:EtherCAT
C06.00	EtherCAT Secondary site name rectification	0~65535
C06.01	EtherCAT Secondary site alias	0~65535
C06.04	EtherCATState machine	1: initialization 2: preoperation 4: Safe operation 8: operation
C06.05	EtherCAT Stack version	0~655.35
C06.06	CIA402 Control word	0~0xFFFF
C06.07	CIA402 Status word	0~0xFFFF
C06.08	Boneng controller function block	0:none 1: Variable frequency mode function block

EtherCAT Data transfer parameters:

Parameter label	Parameter name	Parameter setting range
C00.02~C00.17	PZD Output 1 to PZD output 16	0:00 Other: analog interconnection parameters
C00.18~C00.33	PZD output 1 communication base value ~	0~65535
	PZD output 16 communication base value	
C00.34~C00.49	PZD Input 1 communication base value ~	0~65535
	PZD Input 16 communication base value	
C00.50~C00.65	PZD Output 1 Data display ~	0~0xFFFF
	PZD Output 16 Data display	
C00.66~C00.81	PZD Input 1 Data display ~	0~0xFFFF
	PZD Input 16 Data display	
P02.00~P02.15	Bus adapter a.pc 1.0~	0~1
	Bus adapter A.PZD1.15	
P07.00~P07.15	Bus adapter A.PZD1~16	0~65535

Note: When the communication base value is 0, the communication base value is invalid。

C00.02 to C00.17 store actual data sent by EtherCAT communication.
C00.66~C00.81 stores actual data received by EtherCAT communication;
C00.50 to C00.65 stores C00.02 to C00.17 PZD output data set base value according to C00.18 to C00.33, and calculate the unit value.
P07.00 to P07.15 stores C00.66 to C00.81 PZD Input data set the base value based on C00.34 to C00.49. The unit value is calculated.
P02.00 to P02.15 stores C00.66 PZD input 1 decomposition bit.

The AD_EC has two communication modes. Select A04.14 drive mode. Before using the ad_EC, set C00.00 to 5:EtherCAT and set C06 parameters as required。

◆ **CoE _VL communication mode**

Set A04.14 to 1: CoE_VL mode and support the Velocity mode under CIA402. For details, see the appendix.

In CoE_VL mode, parameter interconnection will be carried out automatically, as shown in the following table:

Parameter label	name	Parameter setting
B00.00	Start/stop control command source	1：User-defined control module
B00.01	Custom 0FF1 source	Interconnection parameters: P02.00 bus adapter a.PC 1.0
B00.02	Custom OFF2 source 1	Interconnection parameters: P02.01 bus adapter A.PZD1.1
B00.03	Custom OFF3 Source 1	Interconnection parameters: P02.02 bus adapter A.PZD1.2
B00.04	Custom run allows sources	The interconnection parameter: p02.03 bus adapter a.pzd1.3
B00.05	User-defined fault reset source 1	Interconnection parameters: P02.07 bus adapter A. pzd1.7
B00.06	Custom speed command takes reverse source	Interconnection parameters: P02.11 bus adapter a. pzd1.11
B00.15	Ramp function generator (RFG) prohibited source	Interconnection parameters: P02.04 bus adapter A.PZD1.4
B00.16	Ramp function generator (RFG) suspend source	Interconnection parameters: P02.05 bus adapter A. pzd1.5
B00.17	The ramp function generator (RFG) is given as a 0 source	Interconnection parameters: P02.06 bus adapter A.PZD1.6
B02.00	Speed control main setting selection	Interconnection parameters: P07.01 bus adapter A. pzD2

◆normal communication mode:

EtherCAT communication sending and receiving parameters are defined by users. The manufacturer provides 16 sending parameters for T-pzd1-16 and 16 receiving parameters for R-Pzd1-16 for users to configure by themselves (see the appendix for details).

The send data of T-pzd1-16 is displayed as input data from C00.66 to C00.81 PZD.

The received data of r-pzd1-16 is displayed by C00.50 to C00.65 PZD output data.

In ordinary communication mode, open the function block of C06.08 Boneng controller and set it to 1: frequency conversion mode function block.

Some parameters will be connected automatically. See the following table for interconnection parameters. If users need to connect other parameters, they can set them by themselves:

Parameter label	name	Parameter setting
B00.00	Start/stop control command source	1：User-defined control module
B00.01	Custom 0FF1 source	Interconnection parameters: P02.00 bus adapter a.PC 1.0
B00.02	Custom OFF2 source 1	Interconnection parameters: P02.01 bus adapter A.PZD1.1
B00.03	Custom OFF3 Source 1	Interconnection parameters: P02.02 bus adapterA.PZD1.2
B00.04	Custom run allows sources	Interconnection parameters: P02.03 bus adapter A.PZD1.3
B00.05	User-defined fault reset source 1	Interconnection parameters: P02.07 bus adapter A. pzd1.7
B00.06	Custom speed command takes reverse source	Interconnection parameters: P02.11 bus adapter a. pzd1.11
B00.15	Ramp function generator (RFG) prohibited source	Interconnection parameters: P02.04 bus adapter A.PZD1.4
B00.16	Ramp function generator (RFG) suspend source	Interconnection parameters: P02.05 bus adapter A. pzd1.5
B00.17	The ramp function generator (RFG) is given as a 0 source	Interconnection parameters: P02.06 bus adapter A.PZD1.6
B02.00	Speed control main setting selection	Interconnection parameters: P07.01 bus adapter A. pzD2
C00.02	PZD output 1	Interconnection parameter: P12.07 Status word 1
C00.03	PZD output 2	Interconnection parameters: P13.00 Actual motor speed
C00.04	PZD output 3	Interconnection parameters: P06.08 Output current
C00.05	PZD output 4	Interconnection parameters: P06.11 output torque
C00.06	PZD output 5	Interconnection parameters: P12.03 is faulty

Note: To change the C06.08 Bonon controller function block, only after reconnecting to EtherCAT communication (or powering on), the interconnection parameters will be automatically connected (or cancelled). And Boneng controller function block, only effective in the ordinary communication mode.

AD provides user-defined EtherCAT control mode. A04.14 Select 0: common communication mode, and C06.08 select 0: none. After disabling the Bononet controller function block, users can perform parameter association control based on their requirements. The received data is set by C00.02~C00.17 PZD output 1~16, and the motor control is controlled by user-defined interconnection parameters P07.00~P07.15 and P02.00~P02.15.

4.2.11 Control word and status word

Control word

number	definition	description
0	0 = OFF1	Motor braking according to the deceleration time of ramp function generator. The driver shuts down the motor when it reaches static state.
	0 → 1 = ON	When bit2, bit3, and bit4 are all 1, the drive enters the "Running" state.
1	0 = OFF2	Motor shut down immediately, inertial stop.
	1 = OFF2 Does not take effect	The motor can be switched ON
2	0 = quick stop (OFF3)	Quick stop: The motor braking OFF3 deceleration time until static.
	1 = invalid quick stop (OFF3)	The motor can be switched ON
3	0 = Disable running	Turn off the motor immediately
	1 = Enable running	Switch on the motor
4	0 = lock ramp function generator; The driver sets the output of the ramp function generator to 0	The driver sets the output of the ramp function generator to
	1 = Do not block ramp function generator	0
5	0 = stop ramp function generator	Slope function generator enabled.
	1 = Enable ramp function generator	The output of the ramp function generator remains at the current value.
6	0 = lock setting	The output tracking Settings of the ramp function generator.
	1 = Enable setting	Motor braking at ramp function generator deceleration time.
7	0 → 1 = Reset the fault	The motor rises to the speed set value at acceleration time.
8	1 = Click Run command 1	Reset the fault. If the ON command still exists, the drive enters the "power-on lock" state. The fault still exists and the reset instruction is invalid.
9	1 = Click Run command 2	Click the command to switch on the motor
10	Reserve	
11	1 = commutation	Controlled by the fieldbus, the driver uses process data from the fieldbus.
12	1 = Increase of electric potentiometer	Takes the Settings in the reverse drive.
13	1 = reduced electric potentiometer	Raise the set value stored in the electropotentiometer.
14	1 = An external fault occurs	Lower the set value stored in the electropotentiometer.
15	Reserve	

Status word

number	definition	description
0	1= Ready to start	The power supply is connected and the drive is in pre-run condition
1	1= Ready for operation	The motor has been connected (ON/OFF1= 1) and there is no fault at present. Upon receiving the "Run Enable" command, the drive will switch on the motor.
2	1 = Running is enabled	The drive is currently allowed to run
3	1 = A fault occurs	There is a fault in the drive
4	1 = OFF2 is not activated	The inertial parking function is not activated.
5	1 = OFF3 is not activated	Quick stop is not activated.
6	1 = The connection is disabled	The current state is boot lock. You can exit the current state only when OFF1=0 and OFF2, OFF3, and run permit are all 1
7	1 = An alarm is generated	The motor remains on without answering.
8	1 = Speed difference within tolerance range	The "set/actual" difference is within the tolerance range.
9	1 = Local control Request control	Request automation system control driver.
10	1 = Meet or exceed the comparative speed	The rotational speed is greater than or equal to the maximum rotational speed.
11	1 = The current limit or torque limit is reached	A comparative value of current or torque reached or exceeded.
12	Reserve	
13	1 = positive motor rotation	Actual value inside drive > 0.
14	Reserve	
15	Reserve	

4.3 Set value

4.3.1 overview

The drive receives the primary Settings from the Settings source. The main set values are mostly specified motor target speed。

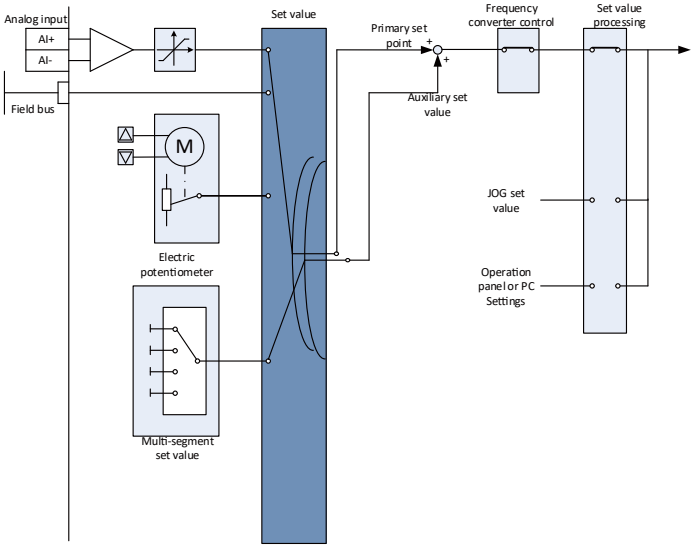


Figure 4-11 Drive Settings processing

The source of the primary set value can be:
◆drive analog input
◆drive field bus interface
◆driver Internal Potentiometer
◆drive in simulation of electric potentiometer
◆drive the fixed value preservation
The driver selects the source of the main setting value through B02.00. For example, when B02.00 selects 3: internal potentiometer, the main setting value can be set by adjusting the knob on the driver.
The above source can also be the source of an auxiliary or additional set value.

Drive control switches from the primary setting to another setting under the following conditions:
◆corresponding interconnected process controller is activated, the controller will output a given motor speed.
◆JOGwhen activated.。
◆when controlled by the operation panel or PC tools Eoperation.

4.3.2 Analog input is set to the set value

Interconnection analog input
When you select a standard setting without analog input functionality, you must interconnect the parameters of the main setting with an analog input.

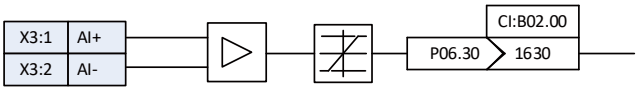


Table 4-7 Analog input is set to the set value

parameter	comment
B02.00 is set to P06.30	Speed source main set selection The main set is connected to the analog input
B02.01 Set this parameter to P06.30	Speed source assisted set selection Auxiliary set values are connected to analog inputs
B02.02 Set this parameter to P06.30	Speed source additional set value selection Additional Settings are connected to analog inputs

4.3.3 The fieldbus is set to the set value

The fieldbus is connected to the main setting

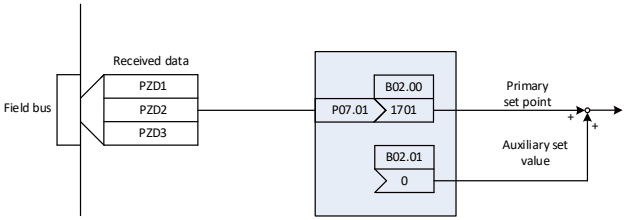


Figure 4-12 Field bus set to the set value

Note: Most standard messages receive and send the speed setting value as the second procedure data PZD2.
Table 4-8 Field bus Settings as set values

parameter	comment
B02.00 is set to P07.01	Speed source main set selection The master set is connected to the process data PZD2 of the fieldbus adapter
B02.01 Set this parameter to P07.01	Speed source assisted set selection Secondary Settings are connected to the process data PZD2 of the fieldbus adapter
B02.02 Set this parameter to P07.01	Speed source additional set value selection The additional Settings are connected to the process data PZD2 of the fieldbus adapter

4.3.4 The electric potentiometer is set to the set value

The "electropotentiometer" function is used to simulate a real potentiometer. The output value of the electropotentiometer can be adjusted by the control signal "up" and "down".

The electric potentiometer is connected to the set value source

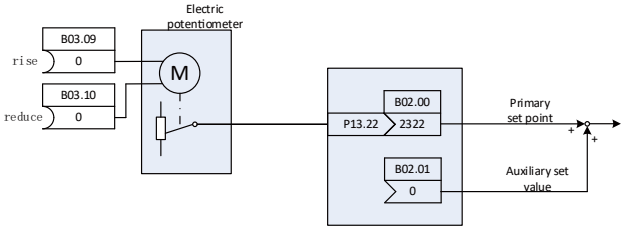


Figure 4-13 Electric potentiometer Set to the set value

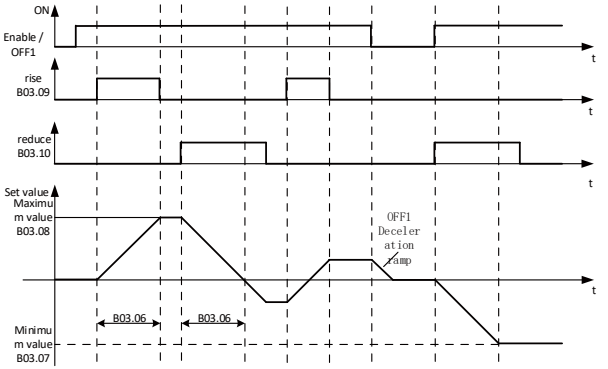


Figure 4-14 Function diagram of an electric potentiometer

Table 4-9 Basic Settings of an electric potentiometer

parameter	description
B03.04	0: forbid
B03.05	1: Turn on
B03.06	Initial value of electric potentiometer
B03.07	Electric potentiometer ramp time
B03.08	Minimum value of electric potentiometer
B03.09	Maximum value of electric potentiometer
B03.10	Electric potentiometer drop source selection

Note: The initial value takes effect in the following three situations: 1. Power off and on; 2. The electric potentiometer is switched to active mode; 3. Changes in initial values.

4.3.5 Multi-stage speed is set to the set value

In many applications, the motor only needs to run at a fixed speed after being energized, or switch back and forth between different fixed speeds. For example, the conveyor belt only uses two different speeds after being connected.

The fixed speed is connected to the main setting

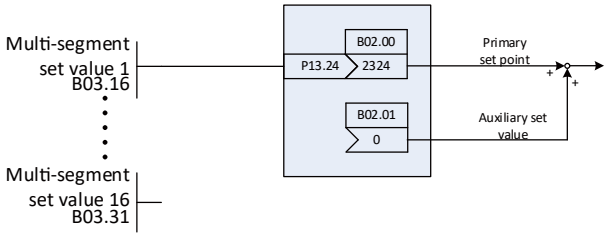


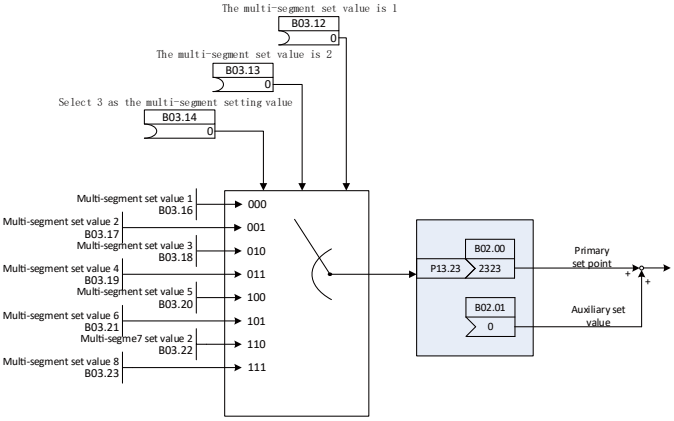
Figure 4-15 Fixed speed Set this parameter

Table 4-10 Fixed Speed Settings Set this parameter

parameter	comment
B02.00 is set to P13.24	Speed source main set selection The primary set is connected to the multi-segment set 1

Binary select multi - segment Settings

Set 8 different fixed Settings. With different combinations of the three selection bits, you can accurately select a fixed set value from the 8.



This parameter is used to set the multi-segment Settings

parameter	description
B03.11	Multiparagraph given valueRead-only parameters show the output values of the current multi-segment
B03.12	Read-only parameter that displays the output value of the current multi-segment Settings
B03.13	Select 1 for the multi-segment given value
B03.14	Select 2 for the multi-segment given value
B03.16	Select 3 for the given value of multiple segments
B03.17	Multi-segment set value 1
B03.18	Multi-segment set value 2
B03.19	Multi-segment set value 3
B03.20	Multi-segment set value 4
B03.21	Multi-segment set value 5
B03.22	Multi-segment set value 6
B03.23	Multi-segment set value 7

4.4 Set value processing

4.4.1 Set value processing list

Set value processing can make the following changes to the set value:

◆take the set point to switch motor direction of rotation (reverse).

◆positive/negative direction of rotation is forbidden, for example: in the conveyor belt, electric pump or fan in the application

◆set the maximum speed limit, in order to protect the electrical and mechanical devices。

◆set up slope function generator, to control the process of acceleration and deceleration of the motor, the output torque

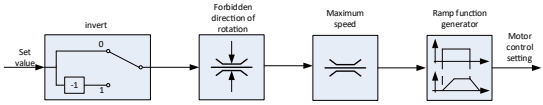
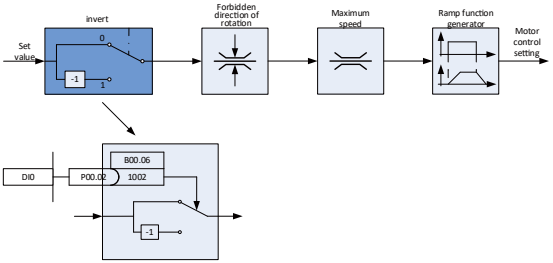


Figure 5-X Settings processing in the drive

4.4.2 Take the inverse set point

The set value symbol can be switched by bit on the drive. The example shows that the inverse set is taken by numeric input.



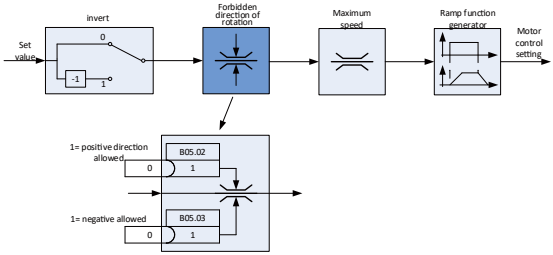
Interconnect the parameter B00.06 with a binary signal (such as the numeric input 0) to take the inverse set via the numeric input DI0.

Table 5-X shows an example of setting reverse values

parameter	comment
B00.06 Set it to P00.02	The set value is inverted Digit input 0 = 0: The set value remains unchanged. Digit input 0 = 1: The drive inverts the set value.
B00.06 Set this parameter to P02.01	Digit input 0 = 0: The set value remains unchanged.

4.4.3 Prohibited direction of rotation

In the driver factory Settings, both positive and negative motor rotation directions have been enabled



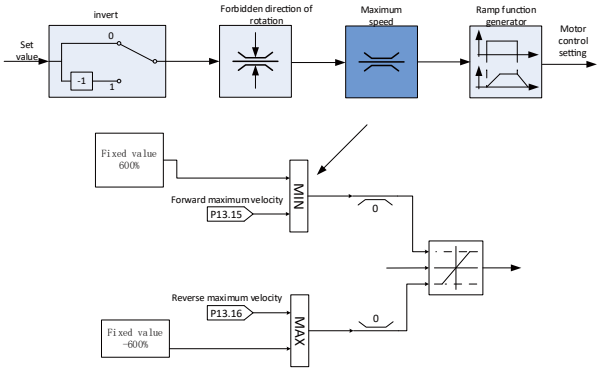
To disable the rotation direction, set the corresponding parameter to 0.

Table 5-X provides an example for disabling the rotation direction

parameter	comment
B05.02 Set this parameter to 0	Positive direction allows selection Do not rotate the motor in the positive direction
B05.00 Set this parameter to P00.03	The negative direction allows choice Digit input 1= 0: The negative rotation direction is disabled. Digit input 1= 1: The negative rotation direction is enabled.

4.4.4 Maximum speed

Maximum speed can limit speed Settings in both rotation directions.



Once this value is exceeded, the driver outputs an alarm or fault message.
When you need to limit the speed depending on the direction, you can determine the maximum speed in each direction.

Table 5-X Parameters for limiting the rotational speed

Parameter	Parameter name
B06.04	Forward limiting velocity
B06.05	Reverse limiting velocity
D00.06	Maximum motor speed

4.4.5 Ramp function generator

The ramp function generator in the set channel is used to limit the rate of change (acceleration) of the speed set. Slower acceleration will
The acceleration torque of the motor is reduced. In this way, the motor can be lightened and the production equipment is protected.
There are two types of slope function generators to choose from:
◆simple slope function generator
The simple ramp function generator limits the acceleration but does not limit the change in acceleration (jerkiness).
◆extension slope function generator
The extended ramp function generator not only limits acceleration, but also rounds out changes in acceleration by setting values (snap Degree) to limit. In this way, there will be no sudden formation of motor torque.

Simple ramp function generator

Simple slope function generator refers to acceleration and deceleration process does not use S curve (arc) time.

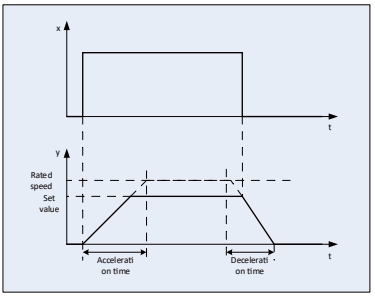
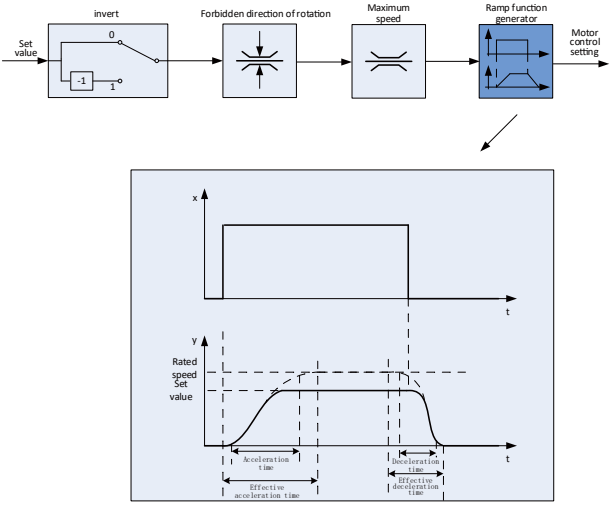


Table 4-14 Parameter Settings of simple ramp function generator

Parameter	Parameter description	description
B04.02	Ramp 1 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.03	Ramp 1 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B04.04	Ramp 2 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.05	Ramp 2 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B04.06	Ramp 3 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.07	Ramp 3 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B04.08	Ramp 4 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.09	Ramp 4 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B05.33	OFF3 Downtime	The emergency stop function (OFF3) has a separate deceleration time.

Extended ramp function generator

The acceleration time and deceleration time of the extended ramp function generator can be set separately. These two times only and practical application
Closely related, can be hundreds of milliseconds (such as conveyor belt drive), can be minutes (such as centrifuge)



The start segment S curve and the end segment S curve can achieve smooth acceleration and deceleration.
The acceleration time and deceleration time of the motor will be added to the S-curve time and the S-curve time is independent of the set frequency(take the first group of time as an example) :
◆Effective acceleration time = B04.02 + 0.5 × (B04.10 + B04.11).
◆Effective deceleration time = B04.03 + 0.5 × (B04.10 + B04.11).

Table 4-15 Parameter Settings of the extended ramp function generator

parameter	Parameter name	description
B04.02	Ramp 1 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.03	Ramp 1 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B04.04	Ramp 2 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.05	Ramp 2 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B04.06	Ramp 3 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.07	Ramp 3 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B04.08	Ramp 4 acceleration time	Refers to the time of motor acceleration from zero to rated speed, unit is s
B04.09	Ramp 4 deceleration time	Refers to the motor from rated speed down to zero time, unit is s
B04.10	Start time of S curve 1	Extend the initial S-curve time of the ramp function generator. This value is valid for both acceleration and deceleration processes.
B04.11	End time of S curve 1	Extend the end section of the ramp function generator S curve time. This value is valid for both acceleration and deceleration processes.
B04.12	Start time of S curve 2	Extend the initial S-curve time of the ramp function generator. This value is valid for both acceleration and deceleration processes.
B04.13	End time of S-curve 2	Extend the end section of the ramp function generator S curve time. This value is valid for both acceleration and deceleration processes.
B04.14	Start time of S curve 3	Extend the initial S-curve time of the ramp function generator. This value is valid for both acceleration and deceleration processes.
B04.15	End time of S-curve 3	Extend the end section of the ramp function generator S curve time. This value is valid for both acceleration and deceleration processes.
B04.16	S-curve 4 start time	Extend the initial S-curve time of the ramp function generator. This value is valid for both acceleration and deceleration processes.
B04.17	End time of S-curve 4	Extend the end section of the ramp function generator S curve time. This value is valid for both acceleration and deceleration processes.

Set up the extended ramp function generator

Set up the extended ramp function generator as follows:

1. Give a maximum speed setting.
2. Switch on the motor.
3. Check the operation of the motor.

–If the motor accelerates too slowly, shorten the acceleration time.

Too short acceleration time will cause the motor to reach the current limit during acceleration and temporarily unable to track the speed setting. At this point, the drive will exceed the set time.

–If the motor accelerates too fast, extend the acceleration time.

–If the acceleration is too rapid, extend the arc time of the initial section.

–We suggest that the end arc time be the same as the start arc time.

4. Close the motor.
5. Check the operation of the motor.

If the motor decelerates too slowly, shorten the deceleration time.

The minimum effective deceleration time depends on the application.

When the deceleration time is too short, the driver will exceed the motor current limit, and the DC bus voltage in the driver will become too high, depending on the power module model used.

Depending on how the drive is set, the actual braking time may exceed the set deceleration time or the drive may fail while braking.

–If the motor braking is too fast or the driver fails during braking, the deceleration time should be extended.

6. Repeat steps 1 through 5 until drive characteristics are obtained that meet the requirements of the motor or equipment.

4.5 Motor control

The driver has the following two speed control modes, which can be selected according to the actual requirements of different applications.

Function code	Parameter name	Ex-factory value	Set range	description
B05.00	Motor control mode	0	0~1	0：VF 1：SVC（Vector control without encoder）

VF: After the given frequency instruction, the driver controls the output voltage according to the VF characteristic curve to control the motor operation. Since there is no speed feedback adjustment, the speed control precision is not high enough. VF control is suitable for general loads such as fans and water pumps, or applications where one driver has multiple motors, or where the power of the driver differs greatly from that of the motor. The vector control mode can be selected in the application where the speed accuracy is required.

SVC: open loop vector control without encoder, suitable for the usual high performance control occasions, in principle, one driver can only drive one motor, such as machine tools, centrifuges and other loads;

* Note: In SVC mode, if one driver drives multiple motors, the motor parameters must be consistent and rigidly connected.

4.5.1 Motor parameter identification

No matter what kind of motor control mode is selected, the basic parameters of the motor must be set accurately according to the motor nameplate before running the motor.
(Take motor 0 as an example, the same below)

Function code	Parameter name	Ex-factory value	Set range	description
A04.16	Motor type selection	0	0~1	0:MP 1:MH
D00.00	Motor type selection	0	0~1	0: asynchronous motor 1: permanent magnet synchronous motor
D00.01	Rated power of motor	0.55	0.00~655.35kW	Motor nameplate parameters
D00.02	Motor rated voltage	400	0~1500V	
D00.03	Rated current of motor	1.6	0.00~655.35A	
D00.04	Rated frequency of motor	50	0.0~600.00Hz	
D00.05	Rated motor speed	1330	0~65535rpm	

When the motor control mode is selected as vector control, accurate motor parameters are required. In order to obtain better motor control performance, parameter identification of the controlled motor is required.

Function code	Parameter name	Ex-factory value	Set range	description
B00.21	Identification request	0	0~3	0: None
				1: induction motor simple static identification
				2: asynchronous motor static complete identification
				3: asynchronous motor dynamic complete identification

The following table shows the differences between the three parameter identification modes. Select them according to the actual application:

mode	Conditions of use	Identification parameter	description
Simple static identification of induction motor	Motor failure	Stator resistance	
Identification of asynchronous motor static integrity	Motor failure	Stator resistance Rotor resistance leakage inductance mutual inductance no-load current	
Complete identification of asynchronous motor dynamics	Motor running		Before identification, please ensure that the motor is separated from the load machinery, and the operation is not dangerous; If the motor is connected to a load, the identification results may not be accurate

1、The motor parameter identification steps are as follows:
2、Set the basic parameters of group D motor correctly according to the current motor selection;
3、Select parameter identification mode according to driver control mode, system mechanical state and other conditions;
4、Press RUN to start parameter identification. If you want to STOP identification during the process, press STOP.
After the identification, the following parameter identification results will be automatically saved. In the premise of knowing the accurate parameters of the motor can not be identified, manually input parameters.

Function code	Parameter name	Ex-factory value	Set range	description
D01.00	Stator resistance of induction motor	14.477	0.000~65.535ohm	Parameter identification or manual input
D01.01	Rotor resistance of induction motor	8.469	0.000~65.535ohm	
D01.02	Induction motor leakage reactance	51.3	0.00~655.35mH	
D01.03	Induction motor mutual inductance	545.3	0.00~6553.5mH	
D01.04	No-load current of asynchronous motor	1.28	0.00~655.35mH	

4.5.2V/Fcontrol

V/Fcurve

The driver can select the V/F characteristic curve based on different load characteristics. The following parameters are valid only when the control mode is VF.

Function code	Parameter name	Ex-factory value	Set range	description
B07.00	VF mode selection	0	0	0: VF curve
B07.01	VF curve selection	0	0~3	0: Straight VF 1: Multipoint VF 2: square VF 3:1.5 VF

0: linear VF, applicable to the torque does not depend on the speed of the occasion, such as ordinary constant torque load
1: Multi-point VF, suitable for dehydrator, centrifuge and other special loads
2: VF squared, suitable for the occasion where the required torque increases with the increase of speed, such as centrifugal load of fans, water pumps and so on
3:1.5 VF, between linear VF and square VF curveVF the curve is shown in the figure.

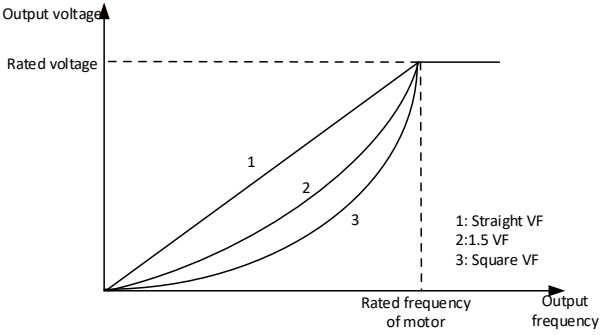


Figure 4-17 VF curve

The multi-point VF curve is defined by parameters B07.02~B07.07, and the following must be met when setting the curve: B07.02&lt for frequency points; B07.04 & lt; B07.06, voltage point set B07.03< B07.05 & lt; B07.07. The parameter Settings should be determined according to the load characteristics. Otherwise, the operation may fail. If the voltage is set too high at low frequency, the motor may overheat or even burn out, and the driver may report overcurrent fault.

Function code	Parameter name	Ex-factory value	Set range	description
B07.02	Multipoint VF curve frequency point 1	2	0.0~B07.04	Select the frequency of multipoint VF
B07.03	Multipoint VF curve voltage point 1	20	0.0~B07.05	Select the voltage point of multipoint VF
B07.04	Multipoint VF curve frequency point 2	20	B07.02~B07.06	Select the frequency of multipoint VF
B07.05	Multipoint VF curve voltage point 2	152	B07.03~B07.07	Select the voltage point of multipoint VF
B07.06	Multipoint VF curve frequency point 3	40	B07.04~D00.04	Select the frequency of multipoint VF
B07.07	Multipoint VF curve voltage point 3	304	B07.05~D00.02	Select the voltage point of multipoint VF

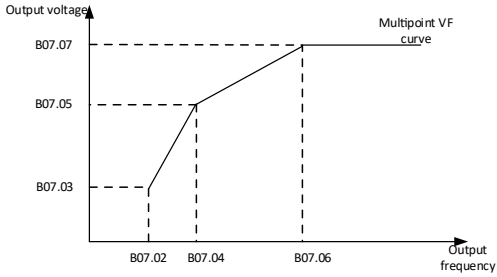


Figure 4-16 multipoint VF curve

Torque lift

Torque boost: Compensate VF control low frequency torque characteristics, by increasing the driver output voltage to increase the output torque.

When the load is large and the starting torque is not enough, the torque lifting B07.15 can be appropriately increased, and the load is small, it can be appropriately reduced. Otherwise, the motor may overheat or the driver may overcurrent. You are advised to increase the value by 1%. After the setting, run the motor and check the value A00.08 (output current), which should not exceed D00.03 (rated current of the motor).

Function code	Parameter name	Ex-factory value	Set range	description
B07.13	VF torque lifting mode	1	0~2	0: disables the function 1: Manual 2: Automatic
B07.15	VF Manual torque lift	1	0%~50%	The lifting voltage is the percentage of the rated
B07.16	VF torque increases cutoff frequency	50	0.00~100.00	When the frequency is set larger than this value, the torque lift is invalid

Note: Torque lifting is invalid under multi-point VF, VF separation, parameter identification and speed

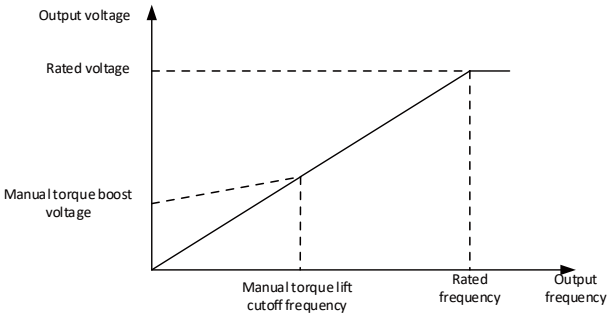


Figure 4-18 Schematic diagram of manual torque lifting

Oscillation suppression

The VF oscillation suppression function is disabled by default. It needs to be enabled only when the VF operation of the motor oscillates significantly. The larger the oscillation suppression gain is, the more obvious the suppression effect will be. However, too large a value may cause adverse effects on the normal operation. Therefore, a smaller value should be selected as far as possible within the value range that can effectively suppress the oscillation.

Functional code	Parameter name	Ex-factory value	description
B07.20	VF oscillation suppression	0	0: invalid 1: Effective
B07.21	VF oscillation suppression gain	10	

4.6Protection function

4.6.1 Overcurrent protection

In vector control, the motor current is always kept within the set torque limit.
If V/F control is used, torque limits cannot be set. V/F control prevents motor overload by limiting output frequency and motor voltage (Imax controller).

Imax controller

In vector control, the motor current is limited by torque limiter. In VF control, the driver limits the current by adjusting the output frequency. If the current exceeds the set threshold during the acceleration of the motor, the I_max controller takes effect and automatically reduces the output frequency so that the current is maintained at about the set value and the actual acceleration time is prolonged. If the motor takes effect during deceleration, the output frequency will be increased and the actual deceleration time will be prolonged. The process is shown below:

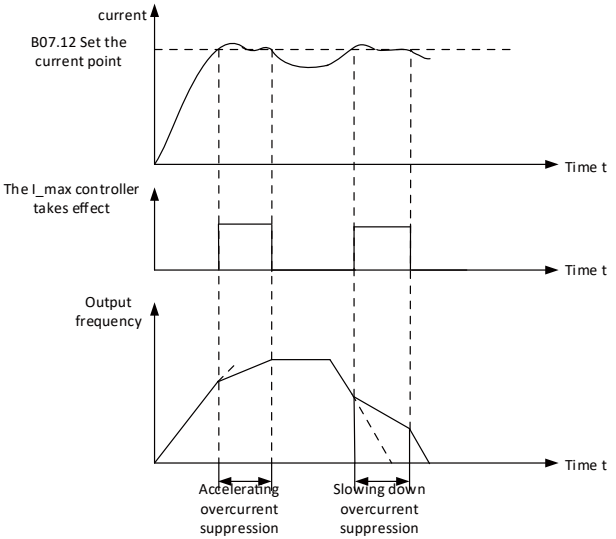


Figure 4-19 Schematic diagram of overcurrent suppression process

set

If the motor is prone to vibration when current limits are reached, or will trip due to overcurrent, the factory Settings of the Imax controller must be modified.

Table 4-16 Imax controller parameters

Function code	Parameter name	Ex-factory value	description
B07.10	The I_max control function is enabled	1	0：invalid 1：effective
B07.11	I_max controls the FM gain	30	The higher the FM gain, the faster the frequency adjustment and the shorter the actual acceleration and deceleration time.
B07.12	I_max suppression point	150%	I_max controls the point at which the operating current begins, the Percentage of drive rated current

Note:
If this function is still easy to trigger overcurrent fault, B07.12 (I_max suppression point) or B07.11 (I_max control FM gain) can be appropriately reduced.

4.6.2 Dc bus voltage overvoltage suppression

How does the motor cause overvoltage?

When an asynchronous motor is driven by a connected load, the motor operates as a generator, which converts mechanical energy into electrical energy. The power is returned to the drive. If the driver cannot transfer power to the brake resistance, the DC bus voltage in the driver will increase Vdc. Too high a DC bus voltage will not only damage the driver, but also damage the motor. Before it reaches a dangerous level, the driver shuts down the connected motor and issues the fault message "DC bus overvoltage".

Overvoltage protection for motor and driver

The Vdc_max controller avoids DC bus overvoltage as long as the application permits. The Vdc_max controller extends the motor shutdown time so that only a small amount of electrical energy is returned to the drive, which can be completely consumed in the form of drive loss.

When the motor is running in the power generation state, the electric energy will be fed back to the DC bus side, and the bus voltage will rise. If the driver is not connected to the brake resistance, the bus voltage will rise to the overvoltage point, and the overvoltage fault will be triggered. The overvoltage suppression function can avoid the overvoltage of the bus as far as possible.

When the motor decelerates sharply, the bus voltage rises rapidly. When it exceeds the set threshold, the Vdc_max controller takes effect. In vector control, the output frequency can be adjusted by limiting the maximum output torque. VF control, directly adjust the output frequency, prolong the actual deceleration time, reduce the electric energy feedback to the bus, so that the bus voltage is maintained at about the set value. The process is shown below:

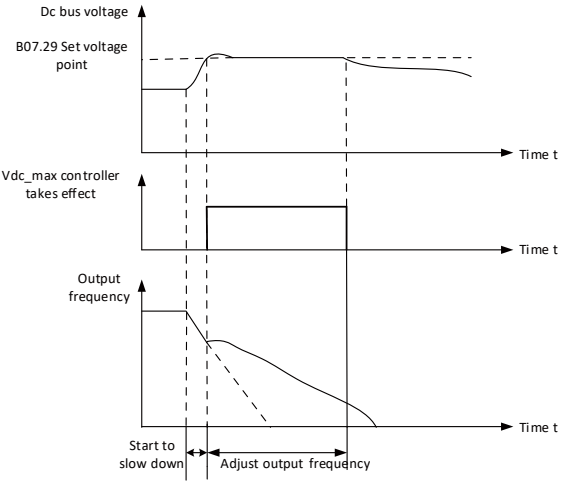


Figure 4-20 Schematic diagram of the overvoltage suppression process

Table 4-17 Vdc_max controller parameters

Function code	Parameter name	Ex-factory value	description
B07.28	Vdc_max control switch	0	0: prohibit 1: Enable
B07.29	Vdc_max voltage margin	125%	Vdc_max control start action voltage point, percentage of reference bus voltage

Note:

1) If the function is still easy to trigger overvoltage fault, B07.29 (Vdc_max voltage margin) can be appropriately reduced.

2) The Vdc_max controller is not suitable for the application of generating renewable energy for a long time. For example: crane applications or braking of large swinging objects.

4.6.3 Dc bus voltage undervoltage suppression

When the driver runs with large inertia load, if the busbar voltage plummets or the power supply falls, the busbar voltage decreases to the undervoltage point, the undervoltage fault will be triggered and the motor will stop freely. Due to the large load inertia, the motor may still run at high speed after the voltage is restored to normal, and immediate start-up is easy to cause overcurrent fault.

The undervoltage suppression function can make use of the kinetic energy of the load to keep the driver working and control the motor to run regularly. When the busbar voltage is reduced to the set threshold, the Vdc_min controller takes effect, and the driver automatically reduces the output frequency, so that the motor is in the power generation state. The electric energy is returned to the DC busbar side, so that the busbar voltage is maintained at about the set value. After the power supply becomes normal, the drive returns to the status before the power failure.The process is shown below:

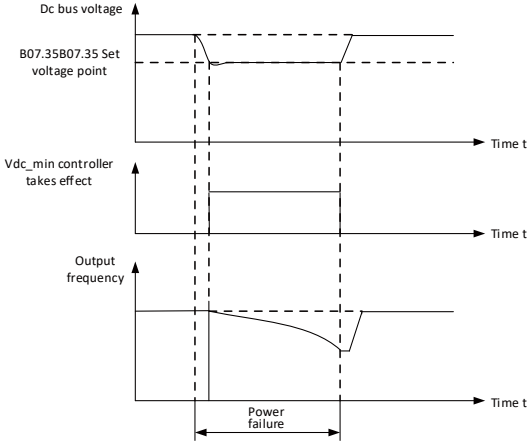


Figure 4-21 Schematic diagram of the undervoltage suppression process

Table 4-18 Vdc_max controller parameters

Function code	Parameter name	Ex-factory value	description
B07.34	Vdc_min Indicates the control switch	0	0: forbid 1: enables the function
B07.35	Vdc_min voltage regulation gain coefficient	85%	Vdc_min controls the starting voltage point and percentage of the reference bus voltage

Note:

If the function is still easy to trigger the undervoltage fault, B07.35 (Vdc_min voltage regulation gain coefficient) can be increased appropriately.

4.7 Application feature

4.7.1 Dc braking

Dc braking: The driver outputs direct current to stop the motor braking, which is shorter than the normal deceleration downtime. Dc braking converts the motor braking energy into heat energy, which can prevent the motor from feeding braking energy back to the driver. The driver does not have to deal with regenerative power. It is suitable for applications that do not feed energy back to the power grid, such as centrifuges, saws, grinders, conveyor belts, etc. Dc braking is divided into the following two situations:

1. Dc braking during shutdown

When the inertia of the motor is large, it will rotate due to inertia in the process of slowing down and stopping. When the DC braking time (B05.11) is greater than 0 during shutdown, the DC braking function will be turned on during shutdown. After the motor starts to slow down and stop, the driver will start DC braking when the motor speed is lower than the initial DC braking speed of shutdown (B05.12). According to the time set by B05.11, the set DC braking current (B05.09) will be output. Motor brake reduction is 0. The DC braking process of shutdown as shown.

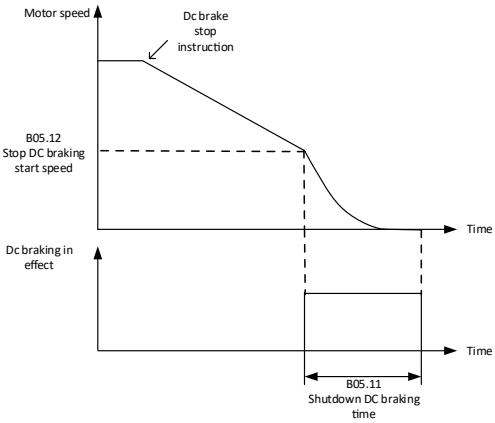


Figure 4-22 stop time dc brake diagram

2. Dc braking when starting

If the motor is in a state of free rotation due to external force or inertia when you want to start the motor, direct start (B05.04 = 0) may lead to overvoltage or overcurrent failure of the drive. In this case, you can choose DC braking start (B05.04 = 3) or speed tracking start (B05.04 = 2). Set the DC braking time at startup (B05.10), the motor will first brake and decelerate to 0, and then restart to run at the specified frequency. The process of starting DC braking as shown.

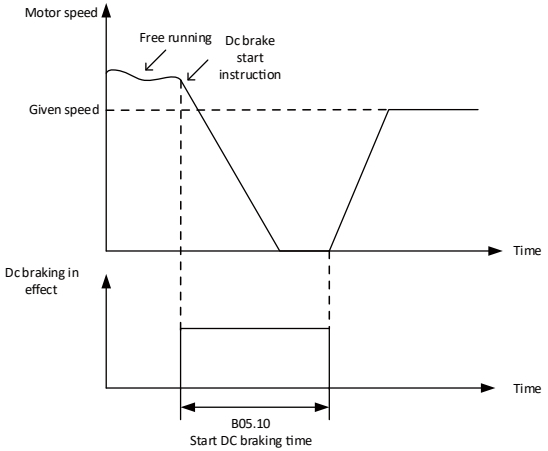


Figure 4-23 Schematic diagram of DC braking process during startup

Function code	Parameter name	Ex-factory value	Set range	description
B05.04	Motor starting mode	0	0~3	0: Direct startup 1: pre-excitation start 2: Speed tracking starts 3: DC braking starts
B05.09	Dc braking current	50	0.0%~100.0%	Brake current Settings for DC braking 100.0% corresponds to the rated motor current
B05.10	Dc braking time at startup	0	0.00s~100.00s	Dc braking time is set when starting 0 is no DC brake start
B05.11	Dc braking time during shutdown	0	0.00s~100.00s	Dc braking time setting during shutdown 0 is no DC braking process during shutdown
B05.12	Stop DC braking start speed	0	0~3000rpm	Start speed of DC braking in shutdown

Note:
Dc braking is only available on asynchronous motors.
◆Dc braking can be switched during operation.
Dc braking will make the motor heated severely, the braking characteristics are not clear, there is no constant braking torque, no braking torque in the static state, braking energy is ◆converted into heat consumption, can not be used when the power grid power down.
◆If the motor is braking in DC braking mode for a long time or often, it will cause the motor to overheat and may lead to motor damage. Please check the motor temperature when using. If the motor temperature is too high, longer cooling time should be given to the motor or other braking methods should be selected.

4.7.2 Speed tracking

When the driver drives the motor to start, the motor may be in a rotating state for some reasons, such as the rotation of the fan under the action of wind and the rotation of the motor driven by large inertia load after shutdown. If the driver starts directly from 0Hz, the difference between the output frequency and the actual frequency of the motor is too large, it is very easy to cause overcurrent fault. The speed tracking function can detect the actual speed of the motor and run from the current speed to avoid overcurrent when starting.
After receiving the running command, the driver judges the rotation direction of the motor, inputs current into the motor (speed tracking current set value), and starts to search downward from the set starting frequency. When the starting frequency is stop frequency, the search speed is the fastest. After searching the current motor speed, the motor will smoothly transition to the normal operation mode and reach the set frequency after switching the waiting time.

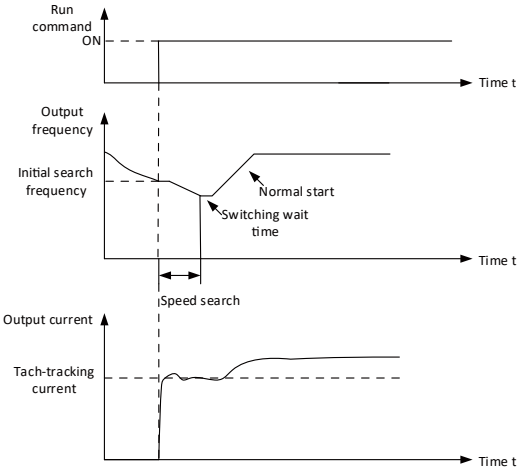


Figure 4-24 shows the speed tracking process

Table 4-19 Speed tracking parameters

Function code	Parameter name	Ex-factory value	description
B05.13	Speed tracking mode	0	0: Speed tracking is off 1: Search from downtime frequency 2: Search from rated frequency 3: Search from the maximum
B05.14	RPM tracking speed search time	25.0s	Time for frequency to decrease from 50Hz to 0Hz
B05.15	Speed tracking current percentage	50%	Velocity search current, Percentage of rated current of the motor
B05.16	Minimum frequency limit for RPM tracking	2Hz	Below the frequency to start directly,RPM tracking does not work
B05.17	RPM tracking switching wait time	250ms	The wait time for RPM tracking mode to be switched to normal operation mode

Note: If the search time is too long, please reduce the search time appropriately.
If an overcurrent or overvoltage fault occurs during the search, increase the search time.

4.7.3 Automatic restart

Automatic restart includes two functions:
◆The drive automatically resets the fault information
◆After the fault is reset, the driver restarts the motor automatically

Set automatic reset for faults
The realization of automatic fault reset function is determined by the following aspects:
Fault reset Reset time: automatically reset a fault within a certain period of time. The start time depends on the time when the fault occurs for the first time after automatic reset is enabled.
Fault reset interval: The minimum interval between two fault reset commands.
Fault reset times: specifies the maximum number of times that a fault reset command is generated within the fault reset reset period. After this number of times, no fault reset command will be generated unless the fault reset reset period ends.

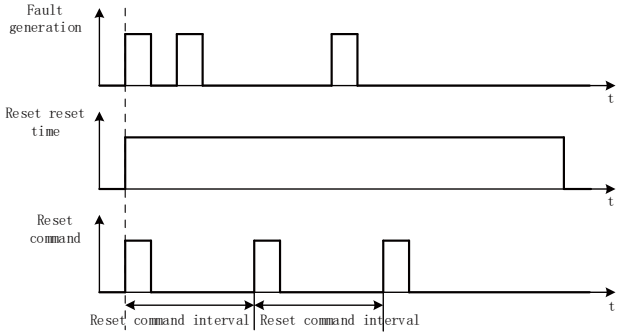


Figure 4-25 Sequence diagram of the automatic reset command

Note:Parameters E00.14, E00.15 can set an unreset fault after the automatic fault reset function is enabled.

Table 4-20 Parameters related to automatic fault reset

parameter	Parameter name
E00.10	Automatic fault reset function
E00.11	Reset times Reset time
E00.12	Time between failure reset
E00.13	Failure reset times
E00.14	Unreset exception code 1
E00.15	Unreset exception code 2

Set automatic restart
Automatic restart takes effect when the fault is automatically reset. If the motor may spin for a long time after a fault occurs, you must also enable the "speed tracking" function in addition, see 4.7.2.

Table 4-21 Setting parameters for Automatic Restart

parameter	Parameter name	description
E00.23	Automatic reset after restart function	The automatic restart function was enabled
E00.24	Exception source that allows restart	0: indicates that the exception code allows restart
		1: indicates that the specified exception code cannot be restarted
E00.25	The specified exception code is 1	Set the fault for special handling
E00.26	The specified exception code 2	Set the fault for special handling

4.7.4PID process controller

overview

Process controllers are used to control process data such as pressure, temperature, level, or flow rate.

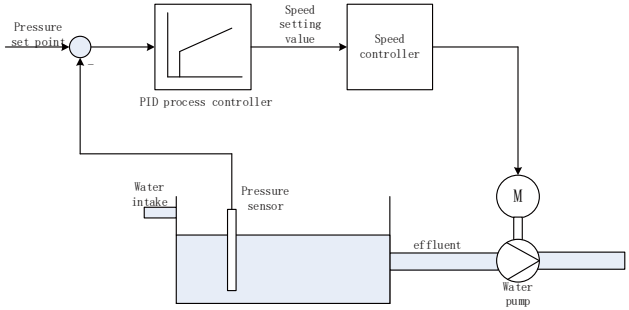
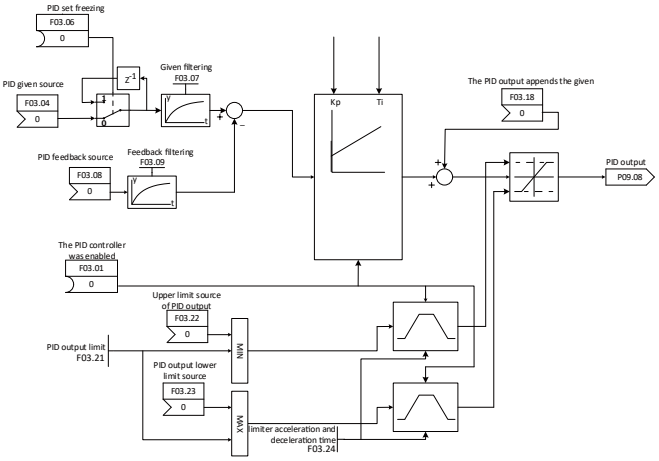


Figure 4-26 Example: The process controller is used as a pressure controller

Set up process controller

Simplified diagram of process controller

The process controller is designed as PID controller (controller with proportional component, integral component and differential component).



Set up process controller

parameter	Parameter name
F03.00	PID function indicates a valid signal
F03.01	PID operation enable signal
F03.04	PID given source source
F03.05	PID value setting
F03.07	PID set filtering time
F03.08	PID feedback source Indicates the source of PID feedback
F03.09	PID feedback filtering time
F03.11	Proportional gain KP
F03.12	Proportional gain coefficient
F03.13	Integration time Ti
F03.14	Integral time coefficient
F03.15	Differentiate time Td1
F03.16	Differential time coefficient

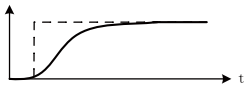
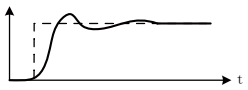
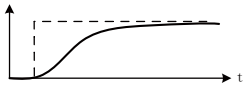
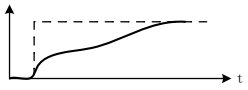
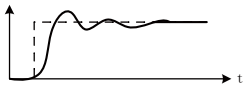
Advanced parameter setting

parameter	Parameter name
F03.06	PID Specifies the freezing function
F03.10	PID deviation is appended to the given
F03.17	Initial value of PID output integral
F03.18	The PID output appends the given
F03.20	PID integral component mandatory value
F03.21	PID output limit
F03.22	Upper limit source of PID output
F03.23	PID output lower limit source
F03.24	PID output limiting rise/fall time
F03.25	PID deviation dead zone is enabled
F03.26	PID deviation dead zone range
F03.27	PID feedback lost the detection value
F03.28	PID feedback loss detection time

Optimized controller

Step

1. Enable the PID process controller and arithmetic.
2. Set a set value step in advance and observe the corresponding actual value. For example, if you use the tracking function of Eoperation, the slower the response of the process to be controlled, the longer you need to observe the controller performance. For example, with temperature control, you have to wait a few minutes until you can discern the performance of the controller.

	Optimal control performance, no overshoot. The actual value is close to the set value without obvious overshoot.
	Optimal control performance, short rise time, short adjustment time when disturbed. The actual value is close to the set value with a slight overshoot, up to 10% of the set step.
	The actual value slowly approaches the set value. Raise the proportional component KP and lower the integral component TI.
	Actual value slowly approaches set value, but slightly overshoots. Raise the proportional component KP and lower the integrating component.Td (difference time).
	The actual value approaches the set value quickly, but the overshoot is large. Lower the proportional component KP and raise the integral component TI.

4.7.5 Free function block

Overview

Configurable signal interconnection can be established within the driver using free function blocks.

The driver mainly provides the following free functional blocks:

◆Logical operation module: AND, OR, NOT

◆Arithmetic operation module: ADD (adder), SUB (subtracter), AVA (absolute value), NCM (comparator)

◆Time relay RLY

There is a limit to the number of free function blocks in a drive. Each function block can only be used once. Drive has 3

It's an adder. Example: If three adders are already configured, you cannot add more adders.

Free feature block list

Logic and module

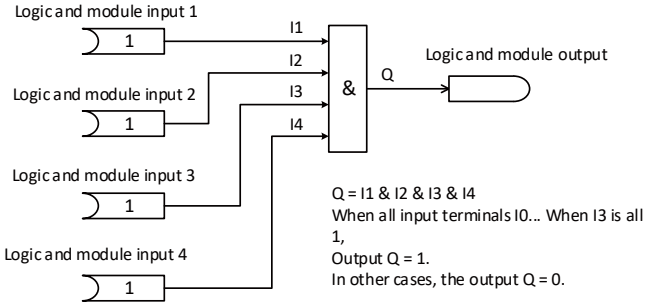


Table 4-22 Logic and Module Settings

	AND A	AND B	AND C	AND D
I1	F00.00	F00.05	F00.10	F00.15
I2	F00.01	F00.06	F00.11	F00.16
I3	F00.02	F00.07	F00.12	F00.17
I4	F00.03	F00.08	F00.13	F00.18
Q	P03.00	P03.01	P03.02	P03.03

Logic or module

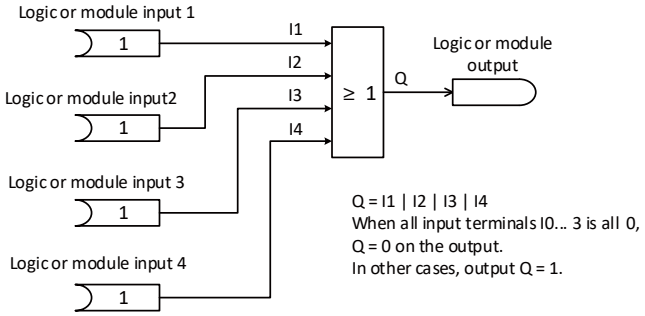


Table 4-23 Logical or module configuration parameters

	OR A	OR B	OR C	OR D
I1	F00.36	F00.41	F00.46	F00.51
I2	F00.37	F00.42	F00.47	F00.52
I3	F00.38	F00.43	F00.48	F00.53
I4	F00.39	F00.44	F00.49	F00.54
Q	P03.12	P03.13	P03.14	P03.15

Logic non-module

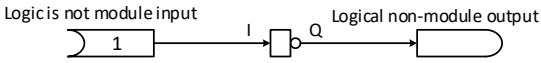


Table 4-24 Logical Non-module parameters

	NOT A	NOT B	NOT C	NOT D	NOT E	NOT F	NOT G	NOT H
I	F00.20	F00.22	F00.24	F00.26	F00.28	F00.30	F00.32	F00.34
Q	P03.04	P03.05	P03.06	P03.07	P03.08	P03.09	P03.10	P03.11

Arithmetic module - additive

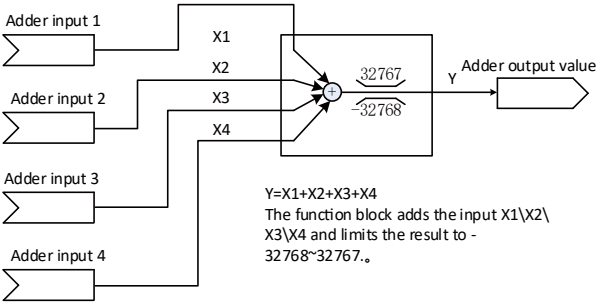


Table 4-25 Adder configuration parameters

	ADD A	ADD B	ADD C
X1	F01.00	F01.05	F01.10
X2	F01.01	F01.06	F01.11
X3	F01.02	F01.07	F01.12
X4	F01.03	F01.08	F01.13
Y	P08.00	P08.01	P08.02

Arithmetic operation module - subtracter

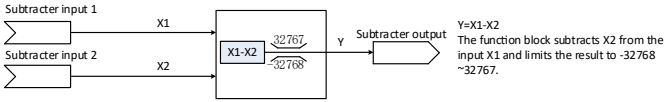


Table 4-26 Subtracter setting parameters

	SUB A	SUB B
X1	F01.15	F01.18
X2	F01.16	F01.19
Y	P08.04	P08.05

Arithmetic operation module - Comparator

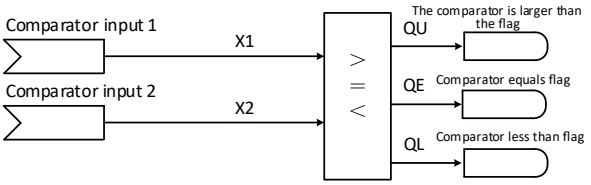


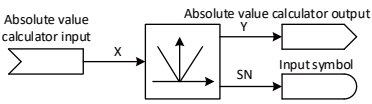
Table 4-27 Function lists

Input comparison	QU	QE	QL
X1＞X2	1	0	0
X1＝X2	0	1	0
X1＜X2	0	0	1

Table 4-28 comparator setting parameters

	NCM A	NCM B
X1	F01.41	F01.44
X2	F01.42	F01.45
QU	P03.24	P03.27
QE	P03.25	P03.28
QL	P03.26	P03.29

Arithmetic operation module - absolute value calculator



Y = abs(X)
This function block is used to calculate the absolute value of the value on the input side X. When X < 0, the frequency converter will set SN = 1.

Table 4-29Absolute value calculator setting parameters

	AVA A	AVA B
X	F01.37	F01.39
Y	P08.24	P08.25
SN	P03.32	P03.33

Time relay

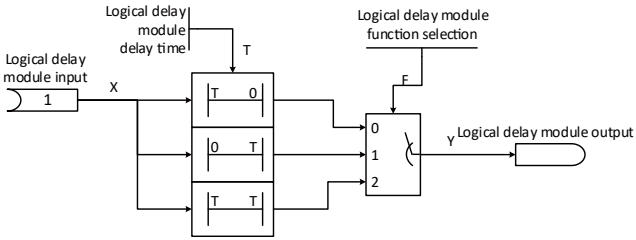


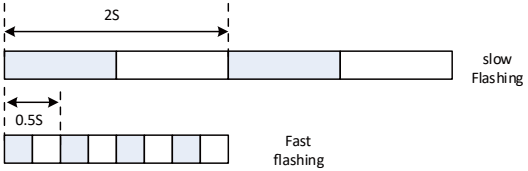
Table 4-30 Time relay setting parameters

	RLY A	RLY B	RLY C	RLY D
X	F00.76	F00.79	F00.82	F00.85
F	F00.77	F00.80	F00.83	F00.86
T	F00.78	F00.81	F00.84	F00.87
Y	P03.20	P03.21	P03.22	P03.23

5 Fault

5.1 LED Indicator Display Description

LED displays the operating status

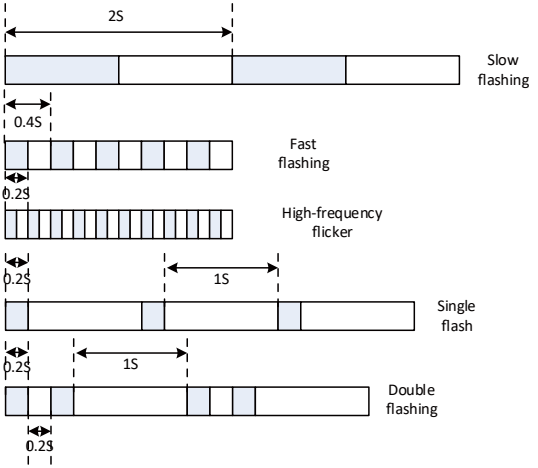


LED lighting status description	
1	luminescence
2	extinguishing
3	Slow flashing (2S cycle)
4	Fast flashing (0.5S cycle)

5.2 LED display of operating status

	LED	Status Description
State machine state	R/E（Green and Red）	
	Green, slowly flashing	Preparation for startup, pre drive, and operation
	Green, flashing rapidly	Power on blocking
	Green, always bright	working
	Red, always bright	fault
	Orange, always bright	Fault shutdown
Upgrade Status	Orange, slowly flashing	Upgrade preparation
	Orange green, alternating flashing	Upgrading
	Orange, flashing rapidly	Upgrade successful
	Red, flashing rapidly	Upgrade failed

LED display of communication status



LED lighting status description	
1	Bright
2	Extinguish
3	Slow flashing (2S cycle)
4	Fast flashing (0.4S cycle)
5	High frequency flicker (0.2S cycle)
6	Single flash (1.2S cycle)
7	Double flash (1.6S cycle)

5.3 LED display communication status

EtherCAT communication status display

LED	Status Description
COMM（Green and Red）	
Turn off the lights	Initialization and other operations
Green, flashing rapidly	EC pre operation
Green, single flashing	EC Safe Operations
Green, always bright	EC in operational state
Red, single flashing	EC synchronization error
Red, double flashing	EC SM watchdog timeout
Red, always bright	EC Other Errors

Modbus communication status

LED	Status Description
COMM（Green and Red）	
Green light, high-frequency flashing	Continuous transmitting and receiving of signals

5.4 Troubleshooting and warning lists

Serial number	Fault name	Fault subcode	Subcode meaning	solution
1	overcurrent	1	Bus flow	1. Remove the problem of power line damage
				2. Check whether the cable is short-circuited
				3. Increase the acceleration and deceleration time
				4. Reduce VF torque lift under VF control
				5. Please confirm that the motor is stopped and stable before starting
		3	UVW current current	6. Reduce or cancel the load
		4	Overcurrent in short circuit to ground	7. Under vector control, please confirm whether the correct parameter identification operation has been carried out
		5	Overvoltage during short circuit to ground	8. Contact the customer or manufacturer for technical support
2	overvoltage	1	Rapid detection of bus overvoltage	1. Check whether the power input is within an appropriate range
				2. Please increase the acceleration and deceleration time
				3. Install brake resistance or brake unit
				4. Contact the customer or manufacturer for technical support
3	undervoltage	1	Bus undervoltage	1. Check whether the power input is within an appropriate range
				2. Check whether the power grid is powered off immediately
				3. Contact the customer or manufacturer for technical support
5	Driver overload	1	Driver overload	1. Check whether the driver type is appropriate or replace the driver with a larger capacity
				2. Reduce VF torque lift under VF control
				3. Reduce torque limit under vector control
				4. Check whether the load is too heavy or the brake is locked
				5. Check whether correct parameter self-learning is performed during vector control
				6. If the encoder is used, please confirm whether the direction and parameters of the encoder are correct
				7. Contact the customer or manufacturer for technical support

Serial number	Fault name	Fault subcode	Subcode meaning	solution
6	Motor overload	1	Motor overload	1. Please confirm whether the load of the motor is too large
				2. Please confirm whether motor parameter self-learning has been carried out during vector control
				3. If the encoder is used, please confirm whether the direction and parameters of the encoder are correct
				4. Check whether the load is too heavy or the brake is locked
				5. Please confirm whether the motor nameplate parameters are set correctly
				6. Contact the customer or manufacturer for technical support
7	Input phase loss	1	Input phase missing detection	1. Check whether the power input cable is in good contact
				2. Contact the customer or manufacturer for technical support
8	Output missing phase	1	U phase output missing phase	1. Check whether the corresponding output cable is connected correctly and in good contact
		2	V phase output missing phase	2. Please confirm whether the motor is running smoothly
		3	W phase output missing phase	3. Contact the customer or manufacturer for technical support
		4	FVC control output is out of phase	
		5	Serious unbalance of three-phase output	
		6	Stator resistance identification output is out of phase	
		7	SVC control output is out of phase	
9	Driver overheat	1	Driver overheat	1. Check whether the ambient temperature is too high
				2. Contact the customer or manufacturer for technical support
11	Current zero drift detection error	1	The U phase zero drift is larger	1. If the PM is abnormal, contact the after-sales service or the manufacturer for technical support
		2	V phase zero drift is larger	
13	Tuning failure	1	Dynamic tuning anomaly	1. Please confirm whether the parameters of the motor nameplate are set correctly
		2	Static tuning failure	2. Contact the customer or manufacturer for technical support
15	Vector stall alarm	1	The velocity is reversed by an external force	1. Please confirm whether the parameters of the motor nameplate are set correctly
				2. Please confirm whether the motor parameter self-learning operation has been performed
				3. Check whether stall parameters are properly set
		2	Excessive velocity deviation	4. Contact the customer or manufacturer for technical support
21	Model setting error	1	Machine exceeds lower limit	1. Check whether the driver model is consistent with the label
				2. Contact the customer or manufacturer for technical support
		2	Model out of limit	

Serial number	Fault name	Fault subcode	Subcode meaning	solution
33	Driver preoverload	1	Drive overload warning	1. Check whether the pre-overload function of the drive is enabled 2. Contact the customer or manufacturer for technical support
34	Motor preoverload	1	Motor overload warning	1. Check whether the pre-overload function of the drive is enabled 2. Contact the customer or manufacturer for technical support
35	Communicati on anomaly	1	Abnormal disconnect during background startup	1. Check whether communication cables of the driver are properly connected
		2	The operation panel is abnormally disconnected during startup	2. Check whether the communication timeout parameter is set properly
		3	The Modbus communication is faulty	3. Contact the customer or manufacturer for technical support
		5	The EtherCAT communication failed	
37	Motor speed exceeds the limit	1	Motor speed exceeds maximum speed limit	1. Please check whether the parameters related to motor overspeed are set properly 2. Contact the customer or manufacturer for technical support
38	Motor speed deviation is too large	1	The motor speed deviates too much from the set speed	1. Please check whether the parameters related to the motor speed deviation are reasonable 2. Contact the customer or manufacturer for technical support
40	PID feedback loss	1	PID feedback sampling value is lost	1. Check the PID feedback signal 2. Contact the customer or manufacturer for technical support
41	External fault	1	External fault 1 occurs	1. Check the external input signals
43	Predrive failure	1	The bus voltage was not detected when the run command was generated	1. Check whether the external supply voltage is abnormal 2. Contact the customer or manufacturer for technical support
47	The control board is overheated	1	The temperature of the control board is overheated	1.Please confirm whether the ambient temperature is too high 2.Contact the after-sales service or the manufacturer for technical support
49	AI wire breaking	1	AI0 4 to 20mA input disconnected	1. Check whether the cabling is interrupted 2. Check the signal level 3. Contact the customer or manufacturer for technical support
		2	AI1 4~20mA input disconnected	
51	Flash fault	1	Flash cannot access	1. Power on the device again 2. Check whether the frequency of modifying the function code is too high 3. Contact the after-sales service or manufacturer for technical support
		2	Function code values are not in the upper and lower limits	
		3	Flash write back error	
		4	The number of function code modifications exceeds the upper limit	
		5	Font library download error Please download the correct version of the font library again	Please re-download the correct version font library

5.5 The common failure of motor and its treatment method

5.5.1 See the following table for the common faults and treatment methods of motors

Fault phenomenon	Possible cause of the fault	Treatment method
(1) Can not start	a. The load or transmission machinery is faulty	Separate the motor from the load. If the motor function starts normally, the dragged machinery should be checked to eliminate obstacles
	b. Frequency converter parameters are improperly set	Check the parameters of frequency converter and adjust them (variable frequency motor)
(2)The speed of the motor after starting is lower than the rated speed	a. The output frequency and output voltage of the converter are improperly set	Reset as required
	b. The load is heavy	Check that the load drive is working properly
(3)The motor has abnormal noise or excessive vibration	a. Mechanical friction (including constant rotor friction)	Check the gap between the rotating part and the stationary part, find out the reason for the collision, and correct
	b. Out-of-phase operation	Power off, then close, if you can't start, there may be a phase of power failure, check the power or motor and repair
	c. Bearing oil shortage or damage	Clean the bearing and add new oil. Or replace the new bearing
	d. The balance of the rotor is damaged after repair	Recalibrate dynamic balance
	e. Elongation and deformation of shaft	Straighten and replace the rotating shaft if necessary
	f. The two coupling connections are loose	Find out where it is loose and tighten the bolt
	g. The installation foundation is unbalanced or defective	Check the fixed foundation and correct it
(4) The motor temperature rise is too high	a. Overload	Use electromagnetic ammeter to measure the stator current or check the current display value on the converter panel. If overload is found, the load should be reduced
	b. Out-of-phase operation	Check the motor or frequency converter wiring and repair it
	c. Constant and rotor friction	Check bearing assembly for loosening, stator and rotor assembly for bad conditions, and repair
	d. Poor ventilation	Check whether the fan and blades are damaged and the air duct is blocked. Fan or blade damage should be repaired or replaced. Air duct obstruction should be removed from the ventilation objects, remove air duct dirt, dust and debris, so that air circulation
	e. Improper setting of V and f parameters of frequency converter leads to over-excitation at low speed and light load, and the current is greater than the rated value	Adjust V/f parameter Settings (variable frequency motor)
	f. When the DC braking function of the converter is used to brake the motor, the braking current is too large	Adjust the setting of DC braking current, which is generally set at 100%-150% of the rated current according to the frequency of braking.
(6)Bearing overheating	a. Bearing damage	Replacement bearing
	b. Bearing grease is too much, too little or there are impurities	Adjust or replace the grease
	c. Too loose or too tight fit between bearing and shaft, bearing and end cap	Trim to fit
	d. The end covers on both sides of the motor are not properly assembled (not parallel).	Install the end cover on both sides or the bearing cover stop flat and rotate the bolt
	e. Shaft extension end oil seal is improperly installed	Adjust to the proper installation state
	f. Belt installation is too loose or too tight, or the coupling assembly is not good	Adjust to proper mounting condition to adjust belt tightness or coupling mounting
(7) The motor housing is charged	a. The ground is faulty	Check the grounding bolt and whether the grounding cable is in close contact with the chassis
	b. The winding is damp and the insulation resistance is too low	Winding drying
	c. The insulation is damaged and the stator coil touches the iron core	repair
	d. The insulation of the lead cable is worn out	Wrap the damage with insulating material

5.5.2 Motor maintenance

◆ Check the motor regularly.
◆ Keep the motor clean and ventilated.
◆ Check the sealing ring of the shaft extension and replace it in time if necessary.
◆ Check the installation connections and screws.
◆ Special attention should be paid to bearings. Heating or special tools should be used to install and disassemble bearings. Specific details about disassembling bearings can be obtained from our company.
◆ Check bearing operation by monitoring abnormal noise, vibration measurement, temperature detection, monitoring oil consumption or SPM bearing vibration detection element, etc.
◆ If any anomaly occurs, stop the machine immediately, check the cause and eliminate it in time.
◆ The motor should be stored indoors in a dry, shock-proof and dust-proof environment; The surface of the motor without protective layer (shaft extension end and flange) should take anti-rust measures.

6 Function code

6.1 Group A - System Status and Peripherals

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group A00: Status monitoring and Settings						
A00.00	Current state machine	0~30	0	0	30	0x2000
A00.01	Target frequency	-327.68~327.67Hz	0	-327.68	327.67	0x2001
A00.02	Given frequency	-327.68~327.67Hz	0	-327.68	327.67	0x2002
A00.03	Motor frequency	-327.68~327.67Hz	0	-327.68	327.67	0x2003
A00.04	Target velocity	-32768~32767rpm	0	-32768	32767	0x2004
A00.05	Given speed	-32768~32767rpm	0	-32768	32767	0x2005
A00.06	Motor speed	-32768~32767rpm	0	-32768	32767	0x2006
A00.07	Output voltage	0~1000V	0	0	1000	0x2007
A00.08	Output current	0~655.35A	0	0	655.35	0x2008
A00.09	Output power	-32768~32767	0	-327.68	327.67	0x2009
A00.10	Given torque	-300.0~300.0%	0	-300	300	0x200A
A00.11	Output torque	-300.0~300.0%	0	-300	300	0x200B
A00.14	Dc bus voltage	0~1000.0V	0	0	1000	0x200E
A00.15	Radiator temperature	-40~150°	0	-40	150	0x200F
A00.16	DI state	0~65535	0	0	65535	0x2010
A00.41	Select 1 for startup display	0: indicates the current state machine 1: target frequency 2: Set frequency 3: output frequency 4: Target speed 5: indicates the given speed 6: motor speed 7: Output voltage 8: Output current 9: output power 10: Set torque 11: output torque 12: system reservation 13: system reservation 14: DC bus voltage 15: heat sink temperature 16: indicates the DI state	1	0	17	0x2029
A00.42	Select 2 for power-on display	Ditto	3	0	17	0x202A
A00.43	Select 3 for startup display	Ditto	8	0	17	0x202B
A00.44	Select 4 for power-on display	Ditto	11	0	17	0x202C
A00.45	Select 5 for startup display	Ditto	14	0	17	0x202D
A00.46	Select 6 for power-on display	Ditto	15	0	17	0x202E
Group A01: Faults and Warnings						
A01.00	Current fault code 1	0~51	0	0	51	0x2100
A01.01	Current fault code 1 subcode	0~65535	0	0	65535	0x2101
A01.04	Current warning code 1	0~51	0	0	51	0x2104
A01.05	Current warning code 1 subcode	0~65535	0	0	65535	0x2105

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group A02: Frequency converter information and setup						
A02.00	Functional software version number	0.00~655.35	0	0	655.35	0x2200
A02.01	Communication card type	0:无 1:Modbus 2:CANopen 3:ProfibusDP 4:ProfiNet 5:EtherCAT 6:EtherNet/IP 7:CC-Link	0	0	7	0x2201
A02.02	Performance software version	0~65535	0	0	655.35	0x2202
A02.04	Rated power of PM power unit	0.00~655.35	0	0	655.35	0x2204
A02.05	Rated voltage of PM power unit	0~65535	0	0	65535	0x2205
A02.06	Rated current of PM power unit	0.00~655.35	0	0	655.35	0x2206
A02.07	Function code version number	0.00~655.35	0	0	655.35	0x2207
A02.08	Release time	0x0~0xFFFF	0	0	65535	0x2208
Group A03 :PM power unit protection and setup						
A03.08	Carrier frequency setting	0:1KHz 1:2KHz 2:4KHz 3:6KHz 4:8KHz	2	0	4	0x2308
A03.13	DPWM switching	1.00Hz～60.0Hz	8	1	60	0x230D
A03.16	Dead zone compensation is enabled	0: forbid 1: dead zone compensation method 1 2: Dead zone compensation Method	1	0	2	0x2310
A03.19	Input phase missing detection	0: forbid 1: Allow	0	0	1	0x2313
A03.20	Brake resistance action point	600.0~800.OV	700	600	800	0x2314
A03.21	Software undervoltage	85%～150%	100	60	150	0x2315
Group A04: System application and environment Settings						
A04.00	Parameter reset mode	0: invalid 1: Model parameters, motor parameters, fault record no longer bit 2: Motor parameters, fault record no longer bit 3: All parameters are restored to factory defaults 4: Clear the record	0	0	4	0x2400
A04.01	Parameter reset	0: cancel 1: Confirm	0	0	1	0x2401

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group A04: System application and environment Settings						
A04.02	Parameter access level	0: indicates the standard parameter 1: Expand parameters 2: expert parameters 3: manufacturer parameters	0	0	3	0x2402
A04.03	Manufacturer's	0~65535	0	0	65535	0x2403
A04.14	Driver mode selection	0: indicates the common communication mode 1: indicates CoE_VL mode	0	0	65535	0x240E
A04.16	Motor type selection	0:MP 1:MH	0	0	1	0x2410
Group A05: Digital input						
A05.00	DI Physical status	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2500
A05.02	DI Indicates the status after processing	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2502
A05.04	DI forced selection	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2504
A05.06	DI forced data	0x0~0xFFFF	0x0	0x0	0xFFFF	0x2506
A05.08	DI0 opening delay	0.0~6553.5S	0	0	6553.5	0x2508
A05.09	DI0 off delay	0.0~6553.5S	0	0	6553.5	0x2509
A05.10	DI1 opening delay	0.0~6553.5S	0	0	6553.5	0x250A
A05.11	DI1 turn-off delay	0.0~6553.5S	0	0	6553.5	0x250B
A05.12	DI2 opening delay	0.0~6553.5S	0	0	6553.5	0x250C
A05.13	DI2 off delay	0.0~6553.5S	0	0	6553.5	0x250D
A05.14	DI3 opening delay	0.0~6553.5S	0	0	6553.5	0x250E
A05.15	DI3 off delay	0.0~6553.5S	0	0	6553.5	0x250F
Group A07: analog input						
A07.00	AI input value	0.000～10.000	0	0	10	0x2700
A07.01	AI input ratio	-600.0%～600.0%	0	-600	600	0x2701
A07.02	Potentiometer input value	0.000～3.000	0.004	0	3	0x2702
A07.03	Potentiometer input ratio	-600.0%～600.0%	1	-600	600	0x2703
A07.04	AI type	0: Reserved 1:0~10V	1	0	1	0x2704
A07.06	Minimum input value of AI curve	0.000～10.000	0	0	10	0x2706
A07.07	AI curve minimum input ratio	-600.0%～600.0%	0	-600	600	0x2707
A07.08	Maximum input value of AI curve	0.000～10.000	10	0	10	0x2708
A07.09	AI curve maximum input ratio	-600.0%～600.0%	100	-600	600	0x2709
A07.10	Minimum input value of potentiometer	0.000～3.000	0.1	0	3	0x270A
A07.11	Minimum input ratio of potentiometer	-600.0%～600.0%	0	-600	600	0x270B
A07.12	Maximum potentiometer input value	0.000～3.000	2.9	0	3	0x270C
A07.13	Maximum potentiometer input ratio	-600.0%～600.0%	100	-600	600	0x270D
A07.14	AI below minimum input setting selection	00~11	0	0	11	0x270E
A07.15	AI filtering time	0~10000ms	10	0	10000	0x270F
A07.16	Potentiometer filtering time	0~10000ms	10	0	10000	0x2710

6.2 Group B - Control Parameter Group

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
B00 group: System control command Settings						
B00.00	Source of start/stop control commands	0: indicates the terminal control module 1: User-defined control module	0	0	1	0x3000
B00.01	Custom OFF1 source	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x3001
B00.02	Custom OFF2 source 1	0: valid 1: Invalid 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x3002
B00.03	Custom OFF3 Source 1	0: valid 1: Invalid 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x3003
B00.04	Custom run allows sources	0: The operation is not allowed 1: The operation is allowed 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x3004
B00.05	User-defined fault reset source 1	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x3005
B00.06	Custom speed command takes reverse source	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x3006
B00.07	Custom JOG1 source	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x3007
B00.08	Customize the JOG2 source	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x3008

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
B00 group: System control command Settings						
B00.11	OFF3 Source 2	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x300B
B00.13	Fault reset source 2	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x300D
B00.15	Ramp function generator (RFG) forbidden	0:RFG disabled 1:RFG disable invalid 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x300F
B00.16	Ramp function generator (RFG) temporarily	0: The RFG pause is valid 1: The RFG pause is invalid 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x3010
B00.17	Ramp function generator (RFG) to	0:RFG is valid if set to 0 1:RFG set to 0 is invalid 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x3011
B00.21	Identification request	0: None 1: asynchronous 2: Complete identification of asynchronous machine static 3: asynchronous machine dynamic complete identification	0	0	3	0x3015
B00.23	OFF1 Stop mode	0: free stop 1: Slow down and stop	1	0	1	0x3017
B00.24	OFF3 Downtime	0.0s～1000.0s	10	0	1000	0x3018

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group B01: start/stop control module						
B01.01	Start/stop control command mode	0: invalid 1:IN1 starts 2:IN1 starts, and IN2 goes in the direction 3:IN1 starts in the forward direction and IN2 starts in the reverse direction 4:IN1P is started and IN2 is stopped 5:IN1P started, IN2 stopped, IN3 direction 6:IN1P starts in the forward direction, IN2P starts in the reverse direction, and IN3 stops	3	0	6	0x3101
B01.03	Enter IN1 for the start/stop command	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	2	0	10	0x3103
B01.04	Enter IN2 for the start/stop command	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	3	0	10	0x3104
B01.05	Enter IN3 for the start/stop command	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	4	0	10	0x3105
B01.11	JOG1 source	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x310B
B01.12	JOG2 source	0: invalid 1: Reserve 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x310C

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group B02: command source Settings						
B02.00	Speed control main setting selection	0:00 1: Set the value to 1 2:AI 3: internal 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 9: Reserved 10: indicates that Modbus sets unit value 1 Other: analog interconnection parameters	1	0	10	0x3200
B02.01	Speed control auxiliary setting option	Ditto	0	0	10	0x3201
B02.02	Additional velocity setting	Ditto	0	0	10	0x3202
B03 Group: Other command source Settings						
B03.00	JOG1 is given a setting	0:00 1: Set the value to 1 2:AI 3: internal 4 to 5: Reserved 6: multi-segment 7: electric potentiometer 8 to 9: Reserved 10: indicates that Modbus sets unit value 1 Other: analog	1	0	10	0x3300
B03.01	JOG2 Indicates the	Ditto	0	0	10	0x3301
B03.02	JOG acceleration time	0.0~1000.0S	10	0	1000	0x3302
B03.03	JOG deceleration time	0.0~1000.0S	10	0	1000	0x3303
B03.04	Electric potentiometer function	0: forbid 1: Turn on	1	0	1	0x3304
B03.05	Initial value of electric potentiometer	-600.0~600.0%	0	-600	600	0x3305
B03.06	Electric potentiometer ramp time	0.0~1000.0S	10	0	1000	0x3306
B03.07	Minimum value of electric potentiometer	-600.0~600.0%	0	-600	600	0x3307
B03.08	Maximum value of electric potentiometer	-600.0~600.0%	100	-600	600	0x3308
B03.09	Electric potentiometer adds source selection	0:00 1:01 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x3309
B03.10	Electric potentiometer drop source selection	0:00 1:01 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x330A
B03.11	Multi-segment given value	-600.0~600.0%	0	-600	600	0x330B

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
B03 Group: Other command source Settings						
B03.12	Select 1 for the multi-segment given value	0:00 1:01 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x330C
B03.13	Select 2 for the multi-segment given value	Ditto	0	0	10	0x330D
B03.14	Select 3 for the given value of multiple segments	Ditto	0	0	10	0x330E
B03.16	Multi-segment set value 1	-600.0~600.0%	10	-600	600	0x3310
B03.17	Multi-segment set value 2	-600.0~600.0%	20	-600	600	0x3311
B03.18	Multi-segment set value 3	-600.0~600.0%	30	-600	600	0x3312
B03.19	Multi-segment set value 4	-600.0~600.0%	-10	-600	600	0x3313
B03.20	Multi-segment set value 5	-600.0~600.0%	-20	-600	600	0x3314
B03.21	Multi-segment set value 6	-600.0~600.0%	-30	-600	600	0x3315
B03.22	Multi-segment set value 7	-600.0~600.0%	0	-600	600	0x3316
B03.23	Multi-segment set value 8	-600.0~600.0%	0	-600	600	0x3317
Group B04: slope function generator						
B04.00	RFG Ramp time choice 1	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x3400
B04.01	RFG Ramp time Choice 2	Ditto	0	0	10	0x3401
B04.02	Ramp 1 acceleration time	0.0~1000.0S	5	0	1000	0x3402
B04.03	Ramp 1 deceleration time	0.0~1000.0S	5	0	1000	0x3403
B04.04	Ramp 2 acceleration time	0.0~1000.0S	5	0	1000	0x3404
B04.05	Ramp 2 deceleration time	0.0~1000.0S	5	0	1000	0x3405
B04.06	Ramp 3 acceleration time	0.0~1000.0S	5	0	1000	0x3406
B04.07	Ramp 3 deceleration time	0.0~1000.0S	5	0	1000	0x3407
B04.08	Ramp 4 acceleration time	0.0~1000.0S	5	0	1000	0x3408
B04.09	Ramp 4 deceleration time	0.0~1000.0S	5	0	1000	0x3409
B04.10	Start time of S curve 1	0.00~20.00S	0	0	20	0x340A
B04.11	End time of S curve 1	0.00~20.00S	0	0	20	0x340B
B04.12	Start time of S curve 2	0.00~20.00S	0	0	20	0x340C
B04.13	End time of S-curve 2	0.00~20.00S	0	0	20	0x340D
B04.14	Start time of S curve 3	0.00~20.00S	0	0	20	0x340E
B04.15	End time of S-curve 3	0.00~20.00S	0	0	20	0x340F
B04.16	S-curve 4 start time	0.00~20.00S	0	0	20	0x3410
B04.17	End time of S-curve 4	0.00~20.00S	0	0	20	0x3411

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group B05: Motor control selection						
B05.00	Motor control mode	0:VF 1:SVC	0	0	1	0x3500
B05.02	Positive velocity allowance	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	1	0	10	0x3502
B05.03	Negative velocity allowance	Ditto	1	0	10	0x3503
B05.04	Motor starting mode	0: Direct startup 1: pre-excitation start 2: Speed tracking starts 3: DC braking starts	0	0	3	0x3504
B05.06	Pre-excitation time setting	0.00~100.00S	0	0	100	0x3506
B05.08	Pre-excitation current digital setting	10.0% ~ 200.0% 100.0% relative to motor	100	10	200	0x3508
B05.09	Dc braking current	0.0% ~ 100.0% 100.0% corresponds to the motor	50	0	100	0x3509
B05.10	Dc braking time at startup	0.00s~100.00s	0	0	100	0x350A
B05.11	Dc braking time during shutdown	0.00s~100.00s	0	0	100	0x350B
B05.12	Stop DC braking start speed	0～3000rpm	0	0	3000	0x350C
B05.13	Speed tracking mode	0: Speed tracking is off 1: Search from downtime frequency 2: Search from rated frequency 3: Search from the maximum frequency	0	0	3	0x350D
B05.14	RPM tracking speed search time	0.0~120.0S	25	0	120	0x350E
B05.15	Speed tracking current percentage	0~100%	50	0	100	0x350F
B05.16	Minimum frequency limit for RPM tracking	0.00~50.00Hz	2	0	50	0x3510
B05.17	RPM tracking switching wait time	0~60000ms	250	0	60000	0x3511
B05.30	Zero speed stop delay time	0.00~100.00S	0	0	100	0x351E
B05.32	OFF1 Select the shutdown mode	0: free stop 1: Slow down and stop	1	0	1	0x3520
B05.33	OFF3 Downtime	0.0s～1000.0s	10	0	1000	0x3521
Group B06: Motor control limitation and protection						
B06.00	Skip frequency 1 lower limit	0.0% ~ 300.0% 100.0% relative to the motor	0	0	0	0x3600
B06.01	Upper limit of jump frequency 1	0.0% ~ 300.0% 100.0% relative to the motor	0	0	0	0x3601
B06.02	Skip frequency 2 lower limit	0.0% ~ 300.0% 100.0% relative to the motor	0	0	0	0x3602
B06.03	Upper limit of jump frequency 2	0.0% ~ 300.0% 100.0% relative to the motor	0	0	300	0x3603
B06.04	Forward limiting velocity	0.0% ~ 300.0% 100.0% relative to the motor	100	0	300	0x3604

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group B06: Motor control limitation and protection						
B06.05	Reverse limiting velocity	- 300.0% ~ 0% 100.0% relative to the motor	-100	-300	0	0x3605
B06.12	Vector controlled torque limiting	0.0%~200.0%	180	0	200	0x360C
B06.13	Torque limiting before holding brake opening	0.0%~200.0%	180	0	200	0x360D
B06.25	Motor overload software protection	0: forbid 1: Allow	1	0	1	0x3619
B06.26	Motor overload software protection gain	20~1000%	100	20	1000	0x361A
B06.28	Pass speed detection value	0.0% ~ 50.0% 100.0% relative to motor	20	0	50	0x361C
B06.29	Pass speed detection time	0.0S: not detected 0.1S to 60.0S	5	0	60	0x361D
B06.32	The comparison value reaches the detection value	0.0% ~ 300.0% 100.0% relative motor rated speed达	100	0	300	0x3620
B06.33	The comparison value reaches the detection lag value	0.0% ~ B06.32 100.0% relative motor rated speed	3	0	100	0x3621
B06.34	The arrival time of the comparison value	0.0: not detected The value ranges from 0.1s to 300.0s	3	0	600	0x3622
B06.37	Output phase missing detection	0: forbid 1: Allow	1	0	1	0x3625
B06.59	Stall detection time 1	0~5000ms	500	0	5000	0x363B
B06.60	Stall detection time 2	0~5000ms	500	0	5000	0x363C
B06.61	Vector stall detection coefficient 2	0~100%	20	0	100	0x363D
B06.62	SVC control mode	0: indicates control mode 1 1: Control mode 2 2: Control mode 3	0	0	2	0x363E
B06.64	Vector control slip compensation coefficient	50~200%	100	50	200	0x3640
Group B07 :VF control						
B07.00	VF mode selection	0:VF curve 1:VF separation	0	0	1	0x3700
B07.01	VF curve selection	0: Straight VF 1: Multipoint VF 2: square V/F 3: 1.5 times V/F	0	0	3	0x3701
B07.02	Multipoint VF curve frequency point 1	0.0～B07.04	2	0	20	0x3702
B07.03	Multipoint VF curve voltage point 1	0.0～B07.05	20	0	152	0x3703
B07.04	Multipoint VF curve frequency point 2	B07.02～B07.06	20	2	40	0x3704
B07.05	Multipoint VF curve voltage point 2	B07.03～B07.07	152	20	304	0x3705
B07.06	Multipoint VF curve frequency point 3	B07.04~D00.04	40	20	50	0x3706
B07.07	Multipoint VF curve voltage point 3	B07.05～D00.02	304	152	380	0x3707
B07.10	The Imax control function was enabled	0: invalid 1: Effective	1	0	1	0x370A
B07.11	Imax controls the FM gain	0～100	30	0	100	0x370B
B07.12	Imax inhibition point	0～200	150	0	200	0x370C
B07.13	VF torque lifting mode	0: disables 1: Manual 2: Automatic	1	0	2	0x370D

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group B07 :VF control						
B07.15	VF Manual acceleration torque lift	0%～250%	1	0	50	0x370F
B07.16	VF torque increases cutoff frequency	0.00~100.00Hz	50	0	100	0x3710
B07.17	VF slip compensation coefficient	0.0%～300.0%	0	0	300	0x3711
B07.20	VF oscillation suppression mode	0: invalid 1: Effective	1	0	1	0x3714
B07.21	VF oscillation suppression gain	0～500%	10	0	500	0x3715
B07.24	VF overexcitation gain	0～200.0	0	0	200	0x3718
B07.28	Vdc_max control switch	0: forbid 1: enable	0	0	1	0x371C
B07.29	Vdc_max voltage margin	115%~150%	125	115	150	0x371D
B07.34	Vdc_min Indicates the control switch	0: forbid 1: enable	0	0	1	0x3722
B07.35	Vdc_min voltage regulation gain coefficient	65~100	85	65	100	0x3723
Group B08: Speed regulator						
B08.02	Speed loop Kp low speed	0.0~100.0	10	0	100	0x3802
B08.03	Speed loop Ti low speed	0.00~10.00ms	1	0	10	0x3803
B08.04	Speed loop Kp high speed	0.0~100.0	10	0	100	0x3804
B08.05	Speed loop Ti high speed	0.00~10.00ms	2	0	10	0x3805
B08.11	Speed loop switches low frequency	0.00~40.00Hz	5	0	40	0x380B
B08.12	Speed loop switches high frequency	0.00~40.00Hz	10	5	40	0x380C
B08.13	Speed loop switching high frequency correction factor	0.0~400.0%	100	0	400	0x380D
B08.26	Estimated velocity loop filtering time	0~10000ms	35	0	10000	0x381A
Group B09: Current regulator						
B09.04	Scale coefficient of current loop	1%~1000%	100	1	1000	0x3904
B09.05	Integral coefficient of current loop	1%~1000%	100	1	1000	0x3905
Group B11: Motor model and others						
B11.51	Monitor channel 1	0~65535	207	0	65535	0x3B33
B11.52	Monitoring channel 2	0~65535	209	0	65535	0x3B34
B11.53	Monitoring channel 3	0~65535	210	0	65535	0x3B35
B11.54	Monitoring channel 4	0~65535	211	0	65535	0x3B36
B11.56	Upper motor frequency limit	0~65535	1200	0	65535	0x3B38
B11.57	Upper generation frequency limit	0~65535	800	0	65535	0x3B39
B11.75	The overload rate limiting function is enabled	0~65535	0	0	65535	0x3B4B
B11.78	reserve	0~65535	0	0	65535	0x3B4E

6.3 Group C - Communications Parameter Group

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group C00: Field bus adapter A						
C00.00	Bus adapter Matching bus type	0:Nothing 1:Modbus 5:EtherCAT	0	0	7	0x4000
C00.01	Data processing method after communication failure	0: Data retention 1: Data reset (reserved)	0	0	1	0x4001
C00.02	PZD output 1	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4002
C00.03	PZD output 2	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4003
C00.04	PZD output 3	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4004
C00.05	PZD output 4	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4005
C00.06	PZD output 5	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4006
C00.07	PZD output 6	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4007
C00.08	PZD output 7	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4008
C00.09	PZD output 8	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4009
C00.10	PZD output 9	0:00 Other: analog quantity interconnection parameters	0	0	0	0x400A
C00.11	PZD output 10	0:00 Other: analog quantity interconnection parameters	0	0	0	0x400B
C00.12	PZD output 11	0:00 Other: analog quantity interconnection parameters	0	0	0	0x400C
C00.13	PZD output 12	0:00 Other: analog quantity interconnection parameters	0	0	0	0x400D
C00.14	PZD output 13	0:00 Other: analog quantity interconnection parameters	0	0	0	0x400E
C00.15	PZD output 14	0:00 Other: analog quantity interconnection parameters	0	0	0	0x400F
C00.16	PZD output 15	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4010

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group C00: Field bus adapter A						
C00.17	PZD output 16	0:00 Other: analog quantity interconnection parameters	0	0	0	0x4011
C00.18	PZD output 1 communication base value	0~65535	0	0	65535	0x4012
C00.19	PZD output 2 communication base value	0~65535	0	0	65535	0x4013
C00.20	PZD output 3 communication base value	0~65535	0	0	65535	0x4014
C00.21	PZD output 4 communication base value	0~65535	0	0	65535	0x4015
C00.22	PZD output 5 communication base value	0~65535	0	0	65535	0x4016
C00.23	PZD output 6 communication base value	0~65535	0	0	65535	0x4017
C00.24	PZD output 7 communication base value	0~65535	0	0	65535	0x4018
C00.25	PZD output 8 communication base value	0~65535	0	0	65535	0x4019
C00.26	PZD output 9 communication base value	0~65535	0	0	65535	0x401A
C00.27	PZD output 10 communication base value	0~65535	0	0	65535	0x401B
C00.28	PZD Output 11 communication base value	0~65535	0	0	65535	0x401C
C00.29	PZD output 12 communication base value	0~65535	0	0	65535	0x401D
C00.30	PZD output 13 communication base value	0~65535	0	0	65535	0x401E
C00.31	PZD output 14 communication base value	0~65535	0	0	65535	0x401F
C00.32	PZD output 15 communication base value	0~65535	0	0	65535	0x4020
C00.33	PZD output 16 communication base value	0~65535	0	0	65535	0x4021
C00.34	PZD Input 1 communication base value	0~65535	0	0	65535	0x4022
C00.35	PZD input 2 communication base value	0~65535	0	0	65535	0x4023
C00.36	PZD input 3 communication base value	0~65535	0	0	65535	0x4024
C00.37	PZD Input 4 communication base value	0~65535	0	0	65535	0x4025
C00.38	PZD Input 5 communication base value	0~65535	0	0	65535	0x4026
C00.39	PZD input 6 communication base value	0~65535	0	0	65535	0x4027
C00.40	PZD input 7 communication base value	0~65535	0	0	65535	0x4028

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group C00: Field bus adapter A						
C00.41	PZD Input 8 communication base value	0~65535	0	0	65535	0x4029
C00.42	PZD Input 9 communication base value	0~65535	0	0	65535	0x402A
C00.43	PZD Input 10 communication base value	0~65535	0	0	65535	0x402B
C00.44	PZD Input 11 communication base value	0~65535	0	0	65535	0x402C
C00.45	PZD Input 12 communication base value	0~65535	0	0	65535	0x402D
C00.46	PZD Input 13 communication base value	0~65535	0	0	65535	0x402E
C00.47	PZD Input 14 communication base value	0~65535	0	0	65535	0x402F
C00.48	PZD Input 15 communication base value	0~65535	0	0	65535	0x4030
C00.49	PZD Input 16 communication base value	0~65535	0	0	65535	0x4031
C00.50	PZD Output 1 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4032
C00.51	PZD Output 2 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4033
C00.52	PZD Output 3 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4034
C00.53	PZD Output 4 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4035
C00.54	PZD Output 5 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4036
C00.55	PZD Output 6 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4037
C00.56	PZD Output 7 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4038
C00.57	PZD Output 8 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4039
C00.58	PZD Output 9 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x403A
C00.59	PZD Output 10 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x403B
C00.60	PZD Output 11 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x403C
C00.61	PZD Output 12 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x403D
C00.62	PZD Output 13 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x403E
C00.63	PZD Output 14 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x403F
C00.64	PZD Output 15 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4040
C00.65	PZD Output 16 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4041
C00.66	PZD Input 1 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4042
C00.67	PZD Input 2 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4043
C00.68	PZD Input 3 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4044
C00.69	PZD Input 4 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4045
C00.70	PZD Input 5 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4046
C00.71	PZD Input 6 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4047

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group C00: Field bus adapter A						
C00.72	PZD Input 7 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4048
C00.73	PZD Input 8 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4049
C00.74	PZD Input 9 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x404A
C00.75	PZD Input 10 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x404B
C00.76	PZD Input 11 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x404C
C00.77	PZD Input 12 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x404D
C00.78	PZD Input 13 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x404E
C00.79	PZD Input 14 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x404F
C00.80	PZD Input 15 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4050
C00.81	PZD Input 16 Data display	0~0xFFFF	0x0	0x0	0xFFFF	0x4051
Group C02: Modbus communication Settings						
C02.00	Modbus Baud rate	0:2400bps 1:4800bps 2:9600bps 3:19200bps 4:38400bps 5:57600bps 6:115200bps	6	0	6	0x4200
C02.01	Modbus data format	0: Parity check (8-E-1) 1: odd check (8-O-1) 2: No check (8-N-2) 3: No check (8-N-1)	3	0	3	0x4201
C02.02	Modbus Indicates the local address	1~255	1	1	247	0x4202
C02.03	The Modbus reply delay	0~20ms	0	0	20	0x4203
C02.04	Modbus communication timed out	0: void，0.1s~60.0s	2	0	60	0x4204
C02.06	Modbus communication	0: percentage 1: frequency	0	0	1	0x4206
C02.07	Modbus writes function code to	0: update 1: No update	0	0	1	0x4207
Group C06 :EtherCAT communication Settings						
C06.00	EtherCAT Slave station name	0~65535	0	0	65535	0x4600
C06.01	EtherCATSlave alias	0~65535	0	0	65535	0x4601
C06.04	EtherCAT State machine	0:NaN 1: indicates initialization 2: pre-operation NaN 4: Secure operation NaN NaN NaN 8: Operation	0	0	8	0x4604
C06.05	EtherCAT Stack version	0~655.35	0	0	655.35	0x4605
C06.06	CIA402 Control word	0~0xFFFF	0	0	65535	0x4606
C06.07	CIA402 Status word	0~0xFFFF	0	0	65535	0x4607
C06.08	Boneng controller function block	0: None 1: frequency conversion mode function block	0	0	1	0x4608

6.4 Group D - Motor Parameter Group

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group D00: motor 0 basic parameters						
D00.00	Motor type selection	0: induction motor 1: permanent magnet synchronous reach (reservation)	0	0	1	0x5000
D00.01	Motor rating	0.00~655.35kW	0.55	0	655.35	0x5001
D00.02	Motor rated voltage	0~1500V	380	0	1500	0x5002
D00.03	Motor rated current	0.00~655.35A	1.6	0	655.35	0x5003
D00.04	Motor rated frequency	0.0~600.00Hz	50	0	600	0x5004
D00.05	Rated motor speed	0~65535rpm	1330	0	65535	0x5005
D00.06	Maximum motor speed	0.0%~300.0% Rated speed	100	0	300	0x5006
D00.07	Minimum motor speed	0.0%~300.0% Rated speed	0	0	300	0x5007
D00.08	Maximum motor current	0.0%~300.0% Rated speed	100	0	300	0x5008
D00.09	Motor pole number	Read only	2	0	64	0x5009
Group D01: motor 0 identification parameter						
D01.00	Stator resistance of asynchronous motor	0.000~65.535ohm	14.477	0	65.535	0x5100
D01.01	Rotor resistance of asynchronous motor	0.000~65.535ohm	8.469	0	65.535	0x5101
D01.02	Induction motor leakage	0.000~65.535mH	51.3	0	655.35	0x5102
D01.03	Asynchronous motor mutual induction	0.0~6553.5mH	545.3	0	6553.5	0x5103
D01.04	No-load current of asynchronous motor	0.00~655.35A	1.28	0	655.35	0x5104

6.5 Group E - Fault Protection and Recording

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group E00: Troubleshooting						
E00.00	External fault 1 Source	0: invalid 1 Reserve 2~5:DIO~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x6000
E00.10	Automatic fault reset function	0: invalid 1: Effective	0	0	1	0x600A
E00.11	Reset times Reset time	0.0~3600.0s	180	0	3600	0x600B
E00.12	Time between failure reset	0.0~600.0s	30	0	600	0x600C
E00.13	Failure reset times	0~5	5	0	5	0x600D
E00.14	Unreset exception code 1	0~51	0	0	51	0x600E
E00.15	Unreset exception code 2	0~51	0	0	51	0x600F
E00.23	Automatic reset after restart function	0: invalid 1: Effective	0	0	1	0x6017
E00.24	Exception source that allows restart	0: indicates that the exception code allows restart 1: indicates that the specified exception code cannot be restarted	0	0	1	0x6018
E00.25	The specified exception code is 1	0~51	0	0	51	0x6019
E00.26	The specified exception code 2	0~51	0	0	51	0x601A
E00.36	Exception Level Change exception code 1	0~51	0	0	51	0x6024
E00.37	Exception level of exception code 1	0: free stop 1: Reserve 2: Stop by stopping mode 3: Warning 4: No exception is processed	0	0	4	0x6025
E00.38	Exception level Change exception code 2	0~51	0	0	51	0x6026
E00.39	Exception level of exception code 2	0: free stop 1: Reserve 2: Stop by stopping mode 3: Warning 4: No exception is processed	0	0	4	0x6027
Group E01: Latest fault and fault data records						
E01.00	Fault code 1	0~51	0	0	51	0x6100
E01.01	Fault code 1 subcode	0~16	0	0	16	0x6101
E01.02	Fault code 2	0~51	0	0	51	0x6102
E01.03	Fault code 2 subcode	0~16	0	0	16	0x6103
E01.12	Failure speed	-300.00~300.00Hz	0	-300	300	0x610C
E01.13	Fault current	0.00~655.35A	0	0	655.35	0x610D
E01.14	Fault bus voltage	0.0~800.0V	0	0	800	0x610E
E01.15	Fault output torque	-300.0%~300.0%	0	-300	300	0x610F
E01.18	Current running time - hours	0~65535	0	0	65535	0x6112
E01.19	This run time - sec.	0~65535	0	0	65535	0x6113
E01.20	Cumulative running time - hours	0~65535	0	0	65535	0x6114
E01.21	Accumulated running time - sec.	0~65535	0	0	65535	0x6115
E01.22	Fault output voltage	0~6553.5V	0	0	6553.5	0x6116
E01.23	Fault PM status word	0~65535	0x0	0x0	0xFFFF	0x6117

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group E02: Record the previous fault and fault data						
E02.00	Fault code 1	0~51	0	0	51	0x6200
E02.01	Fault code 1 subcode	1~16	0	0	16	0x6201
E02.02	Fault code 2	0~51	0	0	51	0x6202
E02.03	Fault code 2 subcode	1~16	0	0	16	0x6203
E02.12	Failure speed	-300.00~300.00Hz	0	-300	300	0x620C
E02.13	Fault current	0.0~6553.5A	0	0	655.35	0x620D
E02.14	Fault bus voltage	0.0~800.0V	0	0	800	0x620E
E02.15	Fault output torque	-300.0%~300.0%	0	-300	300	0x620F
E02.18	Current running time - hours	0~65535	0	0	65535	0x6212
E02.19	Current run time - sec.	0~65535	0	0	65535	0x6213
E02.20	Cumulative running time - hours	0~65535	0	0	65535	0x6214
E02.21	Accumulated running time - sec.	0~65535	0	0	65535	0x6215
E02.22	Fault output voltage	0~6553.5V	0	0	6553.5	0x6216
E02.23	Fault PM status word	0~65535	0x0	0x0	0xFFFF	0x6217
Group E03: Record the first two failures and fault data						
E03.00	Fault code 1	0~51	0	0	51	0x6300
E03.01	Fault code 1 subcode	1~16	0	0	16	0x6301
E03.02	Fault code 2	0~51	0	0	51	0x6302
E03.03	Fault code 2 subcode	1~16	0	0	16	0x6303
E03.12	Failure speed	-300.00~300.00Hz	0	-300	300	0x630C
E03.13	Fault current	0.0~6553.5A	0	0	655.35	0x630D
E03.14	Fault bus voltage	0.0~800.0V	0	0	800	0x630E
E03.15	Fault output torque	-300.0%~300.0%	0	-300	300	0x630F
E03.18	Current running time - hours	0~65535	0	0	65535	0x6312
E03.19	Current run time - sec.	0~65535	0	0	65535	0x6313
E03.20	Cumulative running time - hours	0~65535	0	0	65535	0x6314
E03.21	Accumulated running time - sec.	0~65535	0	0	65535	0x6315
E03.22	Fault output voltage	0~6553.5V	0	0	6553.5	0x6316
E03.23	Fault PM status word	0~65535	0x0	0x0	0xFFFF	0x6317
Group E04: Records of the first three failures and failure data						
E04.00	Fault code 1	0~51	0	0	51	0x6400
E04.01	Fault code 1 subcode	1~16	0	0	16	0x6401
E04.02	Fault code 2	0~51	0	0	51	0x6402
E04.03	Fault code 2 subcode	1~16	0	0	16	0x6403
E04.12	Failure speed	-300.00~300.00Hz	0	-300	300	0x640C
E04.13	Fault current	0.0~6553.5A	0	0	655.35	0x640D
E04.14	Fault bus voltage	0.0~800.0V	0	0	800	0x640E
E04.15	Fault output torque	-300.0%~300.0%	0	-300	300	0x640F
E04.18	Current running time - hours	0~65535	0	0	65535	0x6312
E04.19	Current run time - sec.	0~65535	0	0	65535	0x6313
E04.20	Cumulative running time - hours	0~65535	0	0	65535	0x6314
E04.21	Accumulated running time - sec.	0~65535	0	0	65535	0x6315
E04.22	Fault output voltage	0~6553.5V	0	0	6553.5	0x6416
E04.23	Fault PM status word	0~65535	0x0	0x0	0xFFFF	0x6417

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group E05: first four failures and failure data records						
E05.00	Fault code 1	0~51	0	0	51	0x6500
E05.01	Fault code 1 subcode	1~16	0	0	16	0x6501
E05.02	Fault code 2	0~51	0	0	51	0x6502
E05.03	Fault code 2 subcode	1~16	0	0	16	0x6503
E05.12	Failure speed	-300.00~300.00Hz	0	-300	300	0x650C
E05.13	Fault current	0.0~6553.5A	0	0	655.35	0x650D
E05.14	Fault bus voltage	0.0~800.0V	0	0	800	0x650E
E05.15	Fault output torque	-300.0%~300.0%	0	-300	300	0x650F
E05.18	**Current running time - hours**	**0~65535**	**0**	**0**	**65535**	**0x6312**
E05.19	**Current run time - sec.**	**0~65535**	**0**	**0**	**65535**	**0x6313**
E05.20	Cumulative running time - hours	0~65535	0	0	65535	0x6314
E05.21	Accumulated running time - sec.	0~65535	0	0	65535	0x6315
E05.22	Fault output voltage	0~6553.5V	0	0	6553.5	0x6516
E05.23	Fault PM status word	0~65535	0x0	0x0	0xFFFF	0x6517
Group E06: First five failures and failure data records						
E06.00	Fault code 1	0~51	0	0	51	0x6600
E06.01	Fault code 1 subcode	1~16	0	0	16	0x6601
E06.02	Fault code 2	0~51	0	0	51	0x6602
E06.03	Fault code 2 subcode	1~16	0	0	16	0x6603
E06.12	Failure speed	-300.00~300.00Hz	0	-300	300	0x660C
E06.13	Fault current	0.0~6553.5A	0	0	655.35	0x660D
E06.14	Fault bus voltage	0.0~800.0V	0	0	800	0x660E
E06.15	Fault output torque	-300.0%~300.0%	0	-300	300	0x660F
E06.18	**Current running time - hours**	**0~65535**	**0**	**0**	**65535**	**0x6312**
E06.19	**Current run time - sec.**	**0~65535**	**0**	**0**	**65535**	**0x6313**
E06.20	Cumulative running time - hours	0~65535	0	0	65535	0x6314
E06.21	Accumulated running time - sec.	0~65535	0	0	65535	0x6315
E06.22	Fault output voltage	0~6553.5V	0	0	6553.5	0x6616
E06.23	Fault PM status word	0~65535	0x0	0x0	0xFFFF	0x6617

6.6 Group F - Free Function Block and Process Parameter Group

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group F00: logical operation module						
F00.00	Logic and Module A input 1	0: invalid Other: binary interconnection parameters	0	0	0	0x7000
F00.01	Logic and Module A input 2	0: invalid Other: binary interconnection parameters	0	0	0	0x7001
F00.02	Enter 3 for Logic and Module A	0: invalid Other: binary interconnection parameters	0	0	0	0x7002
F00.03	Enter 4 for Logic and Module A	0: invalid Other: binary interconnection parameters	0	0	0	0x7003
F00.05	Enter 1 for logic and Module B	0: invalid Other: binary interconnection parameters	0	0	0	0x7005
F00.06	Enter 2 for logic and Module B	0: invalid Other: binary interconnection parameters	0	0	0	0x7006
F00.07	Enter 3 for logic and Module B	0: invalid Other: binary interconnection parameters	0	0	0	0x7007
F00.08	Enter 4 for logic and Module B	0: invalid Other: binary interconnection parameters	0	0	0	0x7008
F00.20	Logic is not input to module A	0: invalid Other: binary interconnection parameters	0	0	0	0x7014
F00.22	Logic is not input by Module B	0: invalid Other: binary interconnection parameters	0	0	0	0x7016
F00.24	Logic is not input to module C	0: invalid Other: binary interconnection parameters	0	0	0	0x7018
F00.26	Logic is not input to module D	0: invalid Other: binary interconnection parameters	0	0	0	0x701A
F00.36	Enter 1 for logic or module A	0: invalid Other: binary interconnection parameters	0	0	0	0x7024
F00.37	Enter 2 for logic or module A	0: invalid Other: binary interconnection parameters	0	0	0	0x7025
F00.38	Enter 3 for logic or module A	0: invalid Other: binary interconnection parameters	0	0	0	0x7026
F00.39	Enter 4 for logic or module A	0: invalid Other: binary interconnection parameters	0	0	0	0x7027
F00.41	Enter 1 for logic or module B	0: invalid Other: binary interconnection parameters	0	0	0	0x7029

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group F00: logical operation module						
F00.42	Enter 2 for logic or module B	0: invalid Other: binary interconnection parameters	0	0	0	0x702A
F00.43	Enter 3 for logic or Module B	0: invalid Other: binary interconnection parameters	0	0	0	0x702B
F00.44	Enter 4 for logic or Module B	0: invalid Other: binary interconnection parameters	0	0	0	0x702C
F00.76	Logical delay module A input	0: invalid Other: binary interconnection parameters	0	0	0	0x704C
F00.77	Logical delay module A Function selection	0: opening delay 1: turn-off delay 2: two-way delay	0	0	2	0x704D
F00.78	Logical delay Indicates the delay time of module A	0~60000ms	0	0	60000	0x704E
F00.79	Logical delay module B Input	0: invalid Other: binary interconnection parameters	0	0	0	0x704F
F00.80	Logical delay module B Function selection	0: opening delay 1: turn-off delay 2: two-way delay	0	0	2	0x7050
F00.81	Logical delay Indicates the delay time of module B	0~60000ms	0	0	60000	0x7051
Group F01: arithmetic operation module						
F01.00	Input 1 to module A of addition	0:00 Other: analog interconnection parameters	0	0	0	0x7100
F01.01	Input 2 to module A of addition	0:00 Other: analog interconnection parameters	0	0	0	0x7101
F01.02	Input 3 to module A of addition	0:00 Other: analog interconnection parameters	0	0	0	0x7102
F01.03	Input 4 to module A of addition	0:00 Other: analog interconnection parameters	0	0	0	0x7103
F01.05	Input 1 to add module B	0:00 Other: analog interconnection parameters	0	0	0	0x7105
F01.06	Input 2 to add module B	0:00 Other: analog interconnection parameters	0	0	0	0x7106
F01.07	Input 3 to add module B	0:00 Other: analog interconnection parameters	0	0	0	0x7107
F01.08	Input 4 to add module B	0:00 Other: analog interconnection parameters	0	0	0	0x7108
F01.15	Subtraction module A input 1	0:00 Other: analog interconnection parameters	0	0	0	0x710F

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group F01: arithmetic operation module						
F01.16	Subtraction module A input 2	0:00 Other: analog interconnection parameters	0	0	0	0x7110
F01.18	Subtraction module B input 1	0:00 Other: analog interconnection parameters	0	0	0	0x7112
F01.19	Subtraction module B input 2	0:00 Other: analog interconnection parameters	0	0	0	0x7113
F01.37	Absolute value module A input	0:00 Other: analog interconnection parameters	0	0	0	0x7125
F01.39	Absolute value module B input	0:00 Other: analog interconnection parameters	0	0	0	0x7127
F01.41	Compare module A input 1	0:00 Other: analog interconnection parameters	0	0	0	0x7129
F01.42	Compare module A input 2	0:00 Other: analog interconnection parameters	0	0	0	0x712A
F01.44	Enter 1 for comparison module B	0:00 Other: analog interconnection parameters	0	0	0	0x712C
F01.45	Enter 2 for comparison module B	0:00 Other: analog interconnection parameters	0	0	0	0x712D
F01.61	Data Selector A command source 1	0:00 1:01 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x713D
F01.62	Data Selector A command Source 2	Ditto	0	0	10	0x713E
F01.63	Data selector A Data source 1	0:00 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x713F
F01.64	Data selector A Data source 2	Ditto	0	0	10	0x7140
F01.65	Data selector A Data source 3	Ditto	0	0	10	0x7141
F01.66	Data selector A Data source 4	Ditto	0	0	10	0x7142
F01.67	Data Selector B command source 1	0:00 1:01 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x7143

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group F01: arithmetic operation module						
F01.68	Data Selector B command Source 2	Ditto	0	0	10	0x7144
F01.69	Data selector B Data source 1	0:00 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x7145
F01.70	Data selector B Data Source 2	Ditto	0	0	10	0x7146
F01.71	Data selector B Data source 3	Ditto	0	0	10	0x7147
F01.72	Data selector B Data Source 4	Ditto	0	0	10	0x7148
Group F03: process PID module						
F03.00	PID function indicates a valid signal	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x7300
F03.01	PID operation enable signal	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x7301
F03.02	Direction of PID action	0: positive 1: Reverse	0	0	1	0x7302
F03.03	PID sampling calculation	1~20	2	1	20	0x7303
F03.04	PID given source source	0: F03.05 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x7304
F03.05	PID value setting	-600.0~600.0%	0	-600	600	0x7305
F03.06	PID Specifies the freezing function	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x7306
F03.07	PID set filtering time	0~60000ms	0	0	60000	0x7307

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group F03: process PID module						
F03.08	PID feedback source Indicates the source of PID feedback	0:00 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x7308
F03.09	PID feedback filtering time	0~60000ms	0	0	60000	0x7309
F03.10	PID deviation is appended to the given	0:00 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x730A
F03.11	Proportional gain KP	0.00~125.00	1	0	125	0x730B
F03.12	Proportional gain coefficient	0:10 0.0% 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x730C
F03.13	Integration time Ti	0~60000ms	10	0	60000	0x730D
F03.14	Integral time coefficient	0:10 0.0% 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x730E
F03.15	Differentiate time Td1	0~60000ms	0	0	60000	0x730F
F03.16	Differential time coefficient	0:10 0.0% 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x7310

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group F03: process PID module						
F03.17	Initial value of PID output integral	0:10 0.0% 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x7311
F03.18	The PID output appends the given	Ditto	0	0	10	0x7312
F03.19	PID integral component is forcibly enabled	0: invalid 1: Effective 2~5:DI0~DI3 6 to 10: Reserved Other: binary interconnection parameters	0	0	10	0x7313
F03.20	PID integral component mandatory value	0:00 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x7314
F03.21	PID output limit	0.0~600.0%	100	0	600	0x7315
F03.22	Upper limit source of PID output	0:10 0% 1: Set the value to 1 2:AI 3: potentiometer 4 to 5: Reserved 6: multi-segment values are set 7: electric potentiometer 8 to 10: reserved Other: analog interconnection parameters	0	0	10	0x7316
F03.23	PID output lower limit source	Ditto	0	0	10	0x7317
F03.24	PID output amplitude limit rise/fall	0.00~100.00S	0	0	100	0x7318
F03.25	time	0: forbid 1: enable	0	0	1	0x7319
F03.26	PID deviation dead zone is enabled	0.0~100.0%	0	0	100	0x731A
F03.27	PID deviation dead zone range	0.0~100.0%	0	0	100	0x731B
F03.28	PID feedback lost the detection value	0.0~60.0S	0	0	60	0x731C

6.7 Group P - Interconnection Parameter Group

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group P: hardware status (binary interconnection parameters)						
P00.00	Logical 0	0	0	0	0	0xE000
P00.01	Logic 1	1	1	1	1	0xE001
P00.02	Multifunctional digital input DI0	0~1	0	0	1	0xE002
P00.03	Multifunctional digital input DI1	0~1	0	0	1	0xE003
P00.04	Multifunctional digital input DI2	0~1	0	0	1	0xE004
P00.05	Multifunctional digital input DI3	0~1	0	0	1	0xE005
P00.10	Multifunctional digital input DI0 inversely	0~1	0	0	1	0xE00A
P00.11	Multifunctional digital input DI1 inversely	0~1	0	0	1	0xE00B
P00.12	Multifunctional digital input DI2 inverts	0~1	0	0	1	0xE00C
P00.13	Multifunctional digital input DI3 inversely	0~1	0	0	1	0xE00D
Group P01: system control word and state (binary interconnection parameters)						
P01.00	Ready to start	0~1	0	0	1	0xE100
P01.01	Ready for operation	0~1	0	0	1	0xE101
P01.02	run	0~1	0	0	1	0xE102
P01.03	Fault activation	0~1	0	0	1	0xE103
P01.06	Power-on lock	0~1	0	0	1	0xE106
P01.07	Alarm activation	0~1	0	0	1	0xE107
P01.09	Comparator arrival	0~1	0	0	1	0xE109
P01.12	Forward velocity	0~1	0	0	1	0xE10C
P01.13	IGBT operation	0~1	0	0	1	0xE10D
P01.14	Click operation is valid	0~1	0	0	1	0xE10E
P01.15	Pre-excited start	0~1	0	0	1	0xE10F
P01.16	Open DC brake	0~1	0	0	1	0xE110
P01.20	The boot is not ready	0~1	0	0	1	0xE114
P01.21	Not ready to run	0~1	0	0	1	0xE115
P01.22	Not running	0~1	0	0	1	0xE116
P01.23	trouble-free	0~1	0	0	1	0xE117
P01.26	Power-on unblocked	0~1	0	0	1	0xE11A
P01.27	No alarm	0~1	0	0	1	0xE11B
P01.29	The comparison value is not reached	0~1	0	0	1	0xE11D
P01.32	Velocity negative	0~1	0	0	1	0xE120
P01.33	IGBT blockade	0~1	0	0	1	0xE121
P01.34	Invalid click run	0~1	0	0	1	0xE122
P01.35	Pre-excitation is complete	0~1	0	0	1	0xE123
P01.36	Dc brake end	0~1	0	0	1	0xE124
P01.44	RFG acceleration	0~1	0	0	1	0xE12C
P01.45	RFG deceleration	0~1	0	0	1	0xE12D
P01.46	RFG constant speed	0~1	0	0	1	0xE12E
P01.62	Motor preoverload state	0~1	0	0	1	0xE13E
P01.63	Zero speed given run	0~1	0	0	1	0xE13F
P01.64	Dc bus live mark	0~1	0	0	1	0xE140
P01.65	The motor speed is zero	0~1	0	0	1	0xE141
P01.66	PID function takes effect	0~1	0	0	1	0xE142
P01.67	PID operation is enabled	0~1	0	0	1	0xE143
P01.68	Direction of PID action	0~1	0	0	1	0xE144
P01.69	PID Specifies the freezing function	0~1	0	0	1	0xE145
P01.70	PID integral component is forcibly enabled	0~1	0	0	1	0xE146
P01.71	PID deviation dead zone is enabled	0~1	0	0	1	0xE147
P01.72	PID saturation state	0~1	0	0	1	0xE148

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group P01: system control word and state (binary interconnection parameters)						
P01.73	Motor overtemperature protection mark	0~1	0	0	1	0xE149
P01.74	Motor overtemperature warning sign	0~1	0	0	1	0xE14A
P01.75	Motor select bit0	0~1	0	0	1	0xE14B
P01.77	RFG selects bit0	0~1	0	0	1	0xE14D
P01.78	RFG selects bit1	0~1	0	0	1	0xE14E
P01.79	Multiple segments given choice 1	0~1	0	0	1	0xE14F
P01.80	Multiple segments given choice 2	0~1	0	0	1	0xE150
P01.81	Multiple segments given choice 3	0~1	0	0	1	0xE151
P01.85	RFG Indicates the running flag	0~1	0	0	1	0xE155
Group P02: FBA and fault flag (binary interconnection parameters)						
P02.00	Bus adapter A.PZD1.0	0~1	0	0	1	0xE200
P02.01	Bus adapter A.PZD1.1	0~1	0	0	1	0xE201
P02.02	Bus adapter A.PZD1.2	0~1	0	0	1	0xE202
P02.03	Bus adapter A.PZD1.3	0~1	0	0	1	0xE203
P02.04	Bus adapter A.PZD1.4	0~1	0	0	1	0xE204
P02.05	Bus adapter A.PZD1.5	0~1	0	0	1	0xE205
P02.06	Bus adapter A.PZD1.6	0~1	0	0	1	0xE206
P02.07	Bus adapter A.PZD1.7	0~1	0	0	1	0xE207
P02.08	Bus adapter A.PZD1.8	0~1	0	0	1	0xE208
P02.09	Bus adapterA.PZD1.9	0~1	0	0	1	0xE209
P02.10	Bus adapter A.PZD1.10	0~1	0	0	1	0xE20A
P02.11	Bus adapter A.PZD1.11	0~1	0	0	1	0xE20B
P02.12	Bus adapter A.PZD1.12	0~1	0	0	1	0xE20C
P02.13	Bus adapter A.PZD1.13	0~1	0	0	1	0xE20D
P02.14	Bus adapter A.PZD1.14	0~1	0	0	1	0xE20E
P02.15	Bus adapter A.PZD1.15	0~1	0	0	1	0xE20F
P02.32	Modbus Communication start and stop command	0~1	0	0	1	0xE220
P02.33	ModbusThe communication inching starts and stops	0~1	0	0	1	0xE221
P02.35	Modbus Communication fault reset	0~1	0	0	1	0xE223
P02.36	Modbus Communication reverse operation	0~1	0	0	1	0xE224

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group P03: Free function Module 1 (Binary interconnection parameters)						
P03.00	Logic and module A output	0~1	0	0	1	0xE300
P03.01	Logic and module B output	0~1	0	0	1	0xE301
P03.04	Logic is not output by module A	0~1	0	0	1	0xE304
P03.05	Logic is not output by module B	0~1	0	0	1	0xE305
P03.06	Logic is not module C output	0~1	0	0	1	0xE306
P03.07	Logical non-module D output	0~1	0	0	1	0xE307
P03.12	Logic or module A output	0~1	0	0	1	0xE30C
P03.13	Logic or module B output	0~1	0	0	1	0xE30D
P03.20	Logical delay module A output	0~1	0	0	1	0xE314
P03.21	Logical delay module B output	0~1	0	0	1	0xE315
P03.24	Compare module A is greater than the flag	0~1	0	0	1	0xE318
P03.25	Compare module A equals flag	0~1	0	0	1	0xE319
P03.26	Compare module A less than flag	0~1	0	0	1	0xE31A
P03.27	Compare module B to the greater than flag	0~1	0	0	1	0xE31B
P03.28	Compare module B equals flag	0~1	0	0	1	0xE31C
P03.29	Compare module B to the less than flag	0~1	0	0	1	0xE31D
P03.32	Absolute value Module A input quantity symbol	0~1	0	0	1	0xE320
P03.33	Absolute value Module B input quantity symbol	0~1	0	0	1	0xE321
P03.34	Absolute value Module A overflow flag	0~1	0	0	1	0xE322
P03.35	Absolute value Module B overflow flag	0~1	0	0	1	0xE323
P03.36	Addition module A overflow flag	0~1	0	0	1	0xE324
P03.37	Addition module B overflow flag	0~1	0	0	1	0xE325
P03.39	Subtraction module A overflow flag	0~1	0	0	1	0xE327
P03.40	Subtraction module B overflow flag	0~1	0	0	1	0xE328

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group P06: running state and peripherals (analog interconnection parameters)						
P06.00	Current state machine	-32768~32767	0	-32768	32767	0xE600
P06.01	Target frequency	-32768~32767	0	-32768	32767	0xE601
P06.02	Given frequency	-32768~32767	0	-32768	32767	0xE602
P06.03	Output frequency	-32768~32767	0	-32768	32767	0xE603
P06.04	Target velocity	-32768~32767	0	-32768	32767	0xE604
P06.05	Given speed	-32768~32767	0	-32768	32767	0xE605
P06.06	Motor speed	-32768~32767	0	-32768	32767	0xE606
P06.07	Output voltage	-32768~32767	0	-32768	32767	0xE607
P06.08	Output current	-32768~32767	0	-32768	32767	0xE608
P06.09	Output power	-32768~32767	0	-32768	32767	0xE609
P06.10	Given torque	-32768~32767	0	-32768	32767	0xE60A
P06.11	Output torque	-32768~32767	0	-32768	32767	0xE60B
P06.12	Torque current	-32768~32767	0	-32768	32767	0xE60C
P06.13	Field current	-32768~32767	0	-32768	32767	0xE60D
P06.14	Dc bus voltage	-32768~32767	0	-32768	32767	0xE60E
P06.15	Radiator temperature	-32768~32767	0	-32768	32767	0xE60F
P06.30	Analog input AI conversion results	-32768~32767	-32768	32767	65535	0xE61E
P06.31	Potentiometer input	-32768~32767	-32768	32767	65535	0xE61F
P06.34	Control board AO output value	-32768~32767	-32768	32767	65535	0xE622
Group P07: communication (analog interconnection parameters)						
P07.00	Bus adapter A.PZD1	0~65535	0	0	65535	0xE700
P07.01	Bus adapter A.PZD2	0~65535	0	0	65535	0xE701
P07.02	Bus adapter A.PZD3	0~65535	0	0	65535	0xE702
P07.03	Bus adapter A.PZD4	0~65535	0	0	65535	0xE703
P07.04	Bus adapter A.PZD5	0~65535	0	0	65535	0xE704
P07.05	Bus adapter A.PZD6	0~65535	0	0	65535	0xE705
P07.06	Bus adapter A.PZD7	0~65535	0	0	65535	0xE706
P07.07	Bus adapter A.PZD8	0~65535	0	0	65535	0xE707
P07.08	Bus adapter A.PZD9	0~65535	0	0	65535	0xE708
P07.09	Bus adapter A.PZD10	0~65535	0	0	65535	0xE709
P07.10	Bus adapter A.PZD11	0~65535	0	0	65535	0xE70A
P07.11	Bus adapter A.PZD12	0~65535	0	0	65535	0xE70B
P07.12	Bus adapter A.PZD13	0~65535	0	0	65535	0xE70C
P07.13	Bus adapter A.PZD14	0~65535	0	0	65535	0xE70D
P07.14	Bus adapter A.PZD15	0~65535	0	0	65535	0xE70E
P07.15	Bus adapter A.PZD16	0~65535	0	0	65535	0xE70F
P07.32	Modbus Control command	0~4	0	0	65535	0xE720
P07.33	Modbus COMM setting value 1	-32768~32767	0	-32768	32767	0xE721
P07.34	Modbus COMM setting value 1	-32768~32768	0	-32768	32767	0xE722
P07.35	Modbus COMM setting value 1 P.U	0~65535	0	0	65535	0xE723
P07.36	Modbus COMM setting value 1 P.U	0~65535	0	0	65535	0xE724

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group P08: free function module (analog interconnection parameters)						
P08.00	Output from addition module A	-32768~32767	0	-32768	32767	0xE800
P08.01	Output from addition module B	-32768~32767	0	-32768	32767	0xE801
P08.04	Subtraction module A output	-32768~32767	0	-32768	32767	0xE804
P08.05	Subtraction module B output	-32768~32767	0	-32768	32767	0xE805
P08.24	Absolute value module A output	-32768~32767	0	-32768	32767	0xE818
P08.25	Absolute value module B output	-32768~32767	0	-32768	32767	0xE819
P08.41	Data selector A output	-32768~32767	0	-32768	32767	0xE829
P08.42	Data selector B output	-32768~32767	0	-32768	32767	0xE82A
Group P09: process application (analog interconnection parameters)						
P09.00	Process PID output (after limiting)	-32768~32767	0	-32768	32767	0xE900
P09.01	Process PID output (before limiting)	-32768~32767	0	-32768	32767	0xE901
P09.02	Process PID proportional output	-32768~32767	0	-32768	32767	0xE902
P09.03	Process PID integral output	-32768~32767	0	-32768	32767	0xE903
P09.04	Process PID differential output	-32768~32767	0	-32768	32767	0xE904
P09.05	Process PID giving quantity	-32768~32767	0	-32768	32767	0xE905
P09.06	Amount of process PID feedback	-32768~32767	0	-32768	32767	0xE906
P09.07	Process PID deviation value	-32768~32767	0	-32768	32767	0xE907
P09.08	Process PID has no value added before deviation value	-32768~32767	0	-32768	32767	0xE908

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group P10: PM system internal variables (analog interconnection parameters)						
P10.00	Given current in axis M	0~65535	0	-32768	32767	0xEA00
P10.01	M-axis feedback current	0~65535	0	-32768	32767	0xEA01
P10.02	T axis is given current	0~65535	0	-32768	32767	0xEA02
P10.03	T-axis feedback current	0~65535	0	-32768	32767	0xEA03
P10.04	Given frequency	0~65535	0	-32768	32767	0xEA04
P10.05	Feedback frequency	0~65535	0	-32768	32767	0xEA05
P10.06	Synchronization frequency	0~65535	0	-32768	32767	0xEA06
P10.07	Encoder frequency	0~65535	0	-32768	32767	0xEA07
P10.08	PM monitors variable 8	0~65535	0	-32768	32767	0xEA08
P10.09	PM monitors variable 9	0~65535	0	-32768	32767	0xEA09
P10.10	M axis set voltage	0~65535	0	-32768	32767	0xEA0A
P10.11	T axis set voltage	0~65535	0	-32768	32767	0xEA0B
P10.12	PM monitors variable 12	0~65535	0	-32768	32767	0xEA0C
P10.13	PM monitor variable 13	0~65535	0	-32768	32767	0xEA0D
P10.14	PM monitors variable 14	0~65535	0	-32768	32767	0xEA0E
P10.15	PM monitors variable 15	0~65535	0	-32768	32767	0xEA0F
P10.16	PM monitor variable 16	0~65535	0	-32768	32767	0xEA10
P10.17	PM monitors variable 17	0~65535	0	-32768	32767	0xEA11
P10.18	PM monitors variable 18	0~65535	0	-32768	32767	0xEA12
P10.19	CRC check count	0~65535	0	-32768	32767	0xEA13
P10.20	PM monitors variable 20	0~65535	0	-32768	32767	0xEA14
P10.21	PM monitors variable 21	0~65535	0	-32768	32767	0xEA15
P10.22	PM monitors variable 22	0~65535	0	-32768	32767	0xEA16
P10.23	PM monitors variable 23	0~65535	0	-32768	32767	0xEA17
P10.24	PM monitor variable 24	0~65535	0	-32768	32767	0xEA18
P10.25	PM monitors variable 25	0~65535	0	-32768	32767	0xEA19
P10.26	Monitor channel 1	0~65535	0	-32768	32767	0xEA1A
P10.27	Monitoring channel 2	0~65535	0	-32768	32767	0xEA1B
P10.28	Monitoring channel 3	0~65535	0	-32768	32767	0xEA1C
P10.29	Monitoring channel 4	0~65535	0	-32768	32767	0xEA1D
P10.30	PM monitors variable 30	0~65535	0	-32768	32767	0xEA1E
P10.31	PM monitors variable 31	0~65535	0	-32768	32767	0xEA1F
P10.32	State machine	0~65535	0	-32768	32767	0xEA20
P10.33	U-phase current	0~65535	0	-32768	32767	0xEA21
P10.34	V-phase current	0~65535	0	-32768	32767	0xEA22
Group P11: CM system internal variables (analog interconnection parameters)						
P11.00	Fixed value 0%	0~65535	0	-32768	32767	0xEB00
P11.01	Fixed value 100%	0~65535	0	-32768	32767	0xEB01
P11.02	Fixed value 200%	0~65535	0	-32768	32767	0xEB02
P11.03	Fixed value 400%	0~65535	0	-32768	32767	0xEB03
P11.04	Fixed value 600%	0~65535	0	-32768	32767	0xEB04
P11.05	Fixed value -100%	0~65535	0	-32768	32767	0xEB05
P11.06	Fixed value -200%	0~65535	0	-32768	32767	0xEB06
P11.07	Fixed value -400%	0~65535	0	-32768	32767	0xEB07
P11.08	Fixed value -600%	0~65535	0	-32768	32767	0xEB08

Function code	Name	Set range	Exfactory value	Lower limit value	Upper limit value	Communication address
Group P13: system setting and feedback (analog interconnection parameters)						
P13.00	Actual motor speed	-32768~32767	0	-32768	32767	0xED00
P13.01	The motor finally sets the speed	-32768~32767	0	-32768	32767	0xED01
P13.02	Principal velocity setting	-32768~32767	0	-32768	32767	0xED02
P13.03	Auxiliary velocity setting	-32768~32767	0	-32768	32767	0xED03
P13.04	Positive and negative rotation limit before speed is given	-32768~32767	0	-32768	32767	0xED04
P13.05	Speed is set before limiting	-32768~32767	0	-32768	32767	0xED05
P13.06	Speed is given after limiting	-32768~32767	0	-32768	32767	0xED06
P13.07	Minimum speed limit after speed given	-32768~32767	0	-32768	32767	0xED07
P13.08	RFG The input speed is set	-32768~32767	0	-32768	32767	0xED08
P13.09	RFG The output speed is set	-32768~32767	0	-32768	32767	0xED09
P13.10	Additional velocity setting	-32768~32767	0	-32768	32767	0xED0A
P13.11	Function final given speed	-32768~32767	0	-32768	32767	0xED0B
P13.12	RFG Indicates the input value of the module	-32768~32767	0	-32768	32767	0xED0C
P13.13	Low number of motor turns	0~65535	0	0	65535	0xED0D
P13.14	High number of motor turns	0~65535	0	0	65535	0xED0E
P13.15	Forward maximum velocity	-32768~32767	0	-32768	32767	0xED0F
P13.16	Negative maximum velocity	-32768~32767	0	-32768	32767	0xED10
P13.22	Electric potentiometer output	-32768~32767	0	-32768	32767	0xED16
P13.23	Multisegment given selection output	-32768~32767	0	-32768	32767	0xED17
P13.24	Multi-segment given value 1	-32768~32767	0	-32768	32767	0xED18
P13.25	Multi-segment given value 2	-32768~32767	0	-32768	32767	0xED19
P13.26	Multi-segment given value 3	-32768~32767	0	-32768	32767	0xED1A
P13.27	Multi-segment given value 4	-32768~32767	0	-32768	32767	0xED1B
P13.28	Multi-segment given value 5	-32768~32767	0	-32768	32767	0xED1C
P13.29	Multi-segment given value of 6	-32768~32767	0	-32768	32767	0xED1D
P13.30	Multi-segment given value 7	-32768~32767	0	-32768	32767	0xED1E
P13.31	Multi-segment given value 8	-32768~32767	0	-32768	32767	0xED1F

7 Modbus-RTU protocol

The AD driver uses standard RS485 communication interface and MODBUS communication protocol to support serial communication between the driver and the host computer or PLC. The communication protocol of an AD driver consists of three layers: the physical layer, data link layer, and application layer. The physical layer and data link layer use the RSA-based Modbus protocol. The application layer controls the running, stopping, and parameter reading and writing of AD drivers.
Modbus is a master-slave protocol. There are two types of communication between host and slave: host request and slave reply; Host broadcasts, slave does not answer. Only one device on the bus is sending at any time. The host polls the slave, and the slave cannot send packets without receiving the command from the host. The host can repeat the command if the communication is incorrect. If no response is received within a given time, the slave machine is considered to be lost. If the slave cannot execute a packet, an exception message is sent to the host. The slave can not communicate with each other directly. The data of one slave must be read and sent to another slave through the software of the host. Slave IP addresses range from 0 to 247. Packets at address 0 are broadcast packets.

RTU data frame

Data format and sending order of each byte: 1 start bit +8 data bits (low send first) +1 parity or no check bit +1 or 2 stop bits.

With RTU mode, message delivery begins with a pause interval of at least 3.5 characters. This is easiest to achieve at a variety of character times at network baud rates (as shown in figure T1-T2-T3-T4 below). The first domain transmitted is the device address. The transmission character that can be used is hexadecimal 0... 9,A... F. Network devices constantly detect the network bus, including pause intervals. When the first domain (the address domain) receives a message, each device decodes it to determine whether to send it to its own. After the last transmission character, a pause of at least 3.5 characters marks the end of the message. A new message can start after this pause.

The entire message frame must be sent as a continuous stream. If there is a pause time of more than 1.5 characters before the frame completes, the receiving device will refresh the incomplete message and assume that the next byte is the address field of a new message. Similarly, if a new message starts with the previous message in less than 3.5 characters, the receiving device will consider it a continuation of the previous message. This will result in an error because the value in the CRC field at the end cannot be correct.

Start at least 3.5 characters free	Slave address	Function code	data	check	Start at least 3.5 characters free

RTU frame format:

Frame head START	The length is 3.5 characters
Slave address ADR	Communication address: 1~247
Command code CMD	03: read slave machine parameters; 06: write slave parameters
DATA content Data (N-1)	Information Content:
DATA content Data (N-2)	Function code parameter address, function code parameter number, function code parameter value, etc.
……	
The data content is DATA0	
CRC CHK low	Detection value: CRC value.
CRC CHK high	
END	The length is 3.5 characters

The A1 driver supports Modbus protocol in RTU (Remote Terminal Unit) mode. The driver supports the following Modbus function codes:
Description of command code and communication data:

CMD	meaning	broadcast	Maximum register number
03H	Read multiple registers	no	5
06H	Write a single register	yes	1
10H	Write multiple registers	yes	5

Command code：03H

Command code 03H (0000 0011) : read N words (16bit data). A maximum of 16 words can be read consecutively.

For example, if the target motor speed is read from the drive whose address is 0x01, the given speed, the current motor speed, the start address of modbus logic is 0x2004, and three consecutive words are read, then the structure of the frame is described as follows:

The host sends:

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x03
Address high	0x20
Address low	0x04
Read byte high	0x00
Read byte low	0x03
CRC low position	0x4F
High CRC	0xCA

Normal response from slave:

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x03
Returns the number of bytes of data	0x06
The first data high	0x05
The first data low	0xDC
Second data high	0x00
Second data low	0x00
...	
The NTH data high	0x00
The NTH data low	0x00
CRC low position	0xXX
High CRC	0xXX

Driver responds to motor target speed 0x05DC(1500rpm), given speed 0x0000, current motor speed 0x0000

Slave abnormal response:

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x83
Fault code	0xXX
CRC low position	0xXX
High CRC	0xXX

The command code is 06H

Command code 06H (0000 0110), write one Word (Word)

For example, if the target speed of a drive whose address is 0x01 is set to 100%, that is, the modbus Logical Address 0xE721 is 0x03E8, the structure of the frame is described as follows:

RTU Host command information

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x06
Address high	0xE7
Address low	0x21
Data high	0x03
Data low	0xE8
CRC low position	0xEF
High CRC	0xCA

Slave responds normally

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x06
Address high	0xE7
Address low	0x21
Data high	0x03
Data low	0xE8
CRC low position	0xEF
High CRC	0xCA

Slave abnormal response:

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x86
Fault code	0xXX
CRC low position	0xXX
High CRC	0xXX

Command code: 10H
Command code 10H (0001 0000), write N words (Word)
For example, write three data entries to address 0x3500 of the drive whose address is 0x01. The structure of the frame is described as follows:
RTU Host command information

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x10
Address high	0x35
Address low	0x00
The number of bytes written is high	0x00
The number of bytes written is low	0x03
Total number of letters	0x06
The first data high	0x00
The first data low	0x01
...	.....
The NTH data high	
The NTH data low	
CRC low position	0xXX
High CRC	0xXX

Slave responds normally

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x10
Address high	0x35
Address low	0x00
Data high	0x00
Data low	0x03
CRC low position	0x8F
High CRC	0XC4

Slave abnormal response:

START	T1-T2-T3-T4
Slave address	0x01
Modbus function code	0x90
Fault code	0xXX
CRC low position	0xXX
High CRC	0xXX

Exception code

code	name	meaning
1	Illegal function code	An unsupported function code was received. Procedure
2	Illegal address	The requested register address is invalid, or the combination of the register address and the number of read requests is invalid
3	Illegal data value	The received data field contains at least one invalid data value
4	Number of unauthorized requests	The number of data requests is greater than the maximum number. Procedure
5	Read only	Read only
6	Stop only for modification	Stop only for modification
8	Have no authority	
9	The receive length is abnormal	The length of the data to be received is different from that of the actual data received

Communication frame error check

Using the RTU frame format, the frame includes a frame error detection field calculated based on the CRC method. The CRC field detects the contents of the entire frame. The CRC field is a two-byte, one-bit binary value. It is calculated by the transmission device and added to the frame. The receiving device recalculates the CRC of the received frame and compares the CRC values with the received CRC values. If the two CRC values are different, it indicates that there is a transmission error. A CRC stores 0xFFFF and then calls a procedure to process more than six consecutive bytes in the frame with the value in the current register. Only 8 bits of data per character are valid for CRC. Start and stop bits and parity bits are not valid. During CRC generation, each 8-bit character is individually different from the register content (XOR), and the result moves to the direction of the least significant bit, while the most significant bit is filled with 0. The LSB is extracted for detection, if the LSB is 1, the register alone and the preset value is different or, if the LSB is 0, then no. The whole process has to

Repeat 8 times. After the last bit (the eighth bit) is completed, the next 8-bit byte is separately different or different from the current value of the register. The value in the final register is the CRC value after all bytes in the frame have been executed. For example, if you need to transmit 11001110, the data contains five ones. If parity is used, the parity bit is 1; if parity is used, the parity bit is 0. During data transmission, the parity bit is calculated and placed at the parity bit position of the frame. If the parity of the accepted data is found to be inconsistent with the preset, a communication error is considered to have occurred. This calculation method of CRC adopts the international standard CRC verification rule. When editing the CRC algorithm, users can refer to the CRC algorithm of relevant standards and write the CRC calculation program that really meets the requirements.

Standard: CRC-16/MODBUS

Polynomial: x16+x15+x2+1(0x8501)

CRC Initial value: 0xFFFF

Now provide a simple function of CRC calculation for user reference (in C language programming):

```
unsigned int crc_cal_value(unsigned char *data_value,unsigned char data_length)
{
int i;
unsigned int crc_value=0xffff;
while(data_length--)
{
crc_value^=*data_value++;
for(i=0;i<8;i++)
{
if(crc_value&0x0001)
crc_value=(crc_value>>1)^0xa001;
else
{
crc_value=crc_value>>1;
}
}
}
returncrc_value;
}
```

Modbus communication parameter address

Control command input to drive: (Write only)

Command word address	Command function
0xE720	0001: Running
	0002: Click operation
	0004: Slow down and stop
	0005: The fault is reset
	0006: Reverse speed
0xE721	Modbus communication setting 1
0xE722	Modbus communication setting 2

Note: The communication set value ranges from -600.0% to 600.0%

8 EtherCAT Protocol

Ethercat is a high-performance, low-cost, simple, topology and flexible industrial Ethernet technology that can be used in the industrial field level of ultra-high speed I/O network, using standard Ethernet physical layer, transmission media double wire or fiber (100base-tx or 100base-fx). The whole protocol process is done in hardware by using the dma technology that reads the network card data from the ethercat chip and the main station in the station. The ethercat system can set up 1000 I/O points within 30us, which can change the data of up to 1486 bytes in 300 us, which is almost equivalent to 12,000 Numbers of input or output. The drive for the control of 100 input and output data is 8 bytes, which is 100usonly. During this period, the system updates the actual position and state of all the axes with command and control Numbers, and the distribution clock technology makes the synchronization deviation less than 1us.

EtherCAT Communication state machine

State specification

state	description	SDO Send and receive	PDO send	PDO receive
Init	No mailbox and process data communication	×	×	×
Pre-Operational	Application layer mailbox data communication	√	×	×
Safe-Operational	Supports mailbox data communication			
	There is process data communication, but only input data is allowed to be read from the station (TPDO is sent), no output signal is generated (RPDO is not received)	√	√	×
Operational	SDO (mailbox) send and receive data, PDO send and receive all feasible states	√	√	√

State transition specification

State transition	description
IP	The primary station configures the secondary station address register
	Configure email communication parameters
	Configure DC clock parameters
	Master station writes status control register, request Pre-OP
PI	Interrupt mailbox communication
PS	The master uses the mailbox to initialize the process data map
	The master station is configured with the SM channel used for process data communication
	The master station is configured with FMMUs
	The master station writes the status controller register, requesting Safe-Op
SP	Terminating update input
SO	The master station sends valid output data.
	Master station requests OP status
OS	Terminates updating the output PDO data
OP	Terminates updating input/output PDO data
SI	The update of input PDO and email data was terminated
OI	The update of input/output PDO and email data is terminated

EtherCAT Communication data transmission

EtherCAT的CoE(CANopen over EtherCAT) Service types include:
1) Emergency information;
2)SDO request;
3)SDO Respond to;
4)TxPDO;
5)RxPDO;
6) Remote TxPDO sends request;
7) Remote RxPDO send request;
8)SDO information。
In PLC programming, Sdos can be read and written using specific functional blocks in the EtherCAT library, and access to Sdos is addressed by Index and SubIndex. SDO can be used to access parameters that do not support PDO access, or that need to be initialized after power-on, or that change less frequently.
Procedure data PDO:
PDO mapping is used to establish the mapping relationship between object dictionary and PDO. The following table shows the PDO allocation on the AD drive:

name	index	Application scenario	Mapping quantity	Default mapping
RPDO1	0x1600	Customize the PDO	8 Max/ 2 default	0x6040 Control word 0x6042 Target speed
RPDO2	0x1701	COE_ VL mode	2 fixed	0x6040 Control word 0x6042 Target speed
RPDO3	0x1702	Common communication mode	16 fixed	0x4000 R-PZD.1~16
TPDO1	0x1A00	Customize the PDO	8 Max/ 2 default	0x6041 Status word 0x6044 Actual Speed
TPDO2	0x1B01	COE_ VL mode	2 fixed	0x6041 Status word 0x6044 Actual Speed
TPDO3	0x1B02	Common communication mode	16 fixed	0x4100 T-PZD.1~16

Mailbox data SDO:
Sdos are used to transmit non-cyclic data, such as configuration of communication parameters, configuration of drive parameters, etc.
SDO termination code:
During the SDO transmission process, if one party finds an error, it can initiate the SDO termination transmission request. After receiving the request, the other party stops the current SDO transmission. The SDO termination transmission request does not need to answer. The SDO data has a 4-byte termination code indicating the specific reason for terminating the transmission, as shown in the following table:

Serial number	Code number	meaning
1	0x05 03 00 00	There is no change in the rollover bit during piecewise transmission
2	0x05 04 00 00	SDO transmission timeout
3	0x05 04 00 01	The command code is invalid or unknown
4	0x05 04 00 05	Memory overflow
5	0x06 01 00 00	Operations on an object are not supported
6	0x06 01 00 01	Read a write only data object
7	0x06 01 00 02	Write a read-only data object
8	0x06 02 00 00	The data object does not exist in the data dictionary
9	0x06 04 00 41	Data objects cannot be mapped to Pdos
10	0x06 04 00 42	The number and length of data objects to be mapped exceeds the PDO data length
11	0x06 04 00 43	Conventional parameters are not compatible
12	0x06 04 00 47	General internal incompatibility in the device
13	0x06 06 00 00	Operation failed due to a hardware error
14	0x06 07 00 10	The data type does not match and the length of the service parameter does not match
15	0x06 07 00 12	The data type does not match, and the service parameter is too long
16	0x06 07 00 13	Data types do not match, and service parameters are too short
17	0x06 09 00 11	The subindex does not exist
18	0x06 09 00 30	The data value was out of range during the write operation. Procedure
19	0x06 09 00 31	The write data value is too large
20	0x06 09 00 32	Write data value is too small
21	0x06 09 00 36	The maximum value is less than the minimum value

AD_EC Communication mode

AD_EC supports two frequency conversion control modes, namely, speed mode (COE_VL) and custom mode (common communication mode).

◆speed mode (COE_VL):

In this mode, 0x6042 is used to set the target speed and 0x6040 is used to control the motor. Read the status word 0x6041 and the actual speed 0x6044 to get the current motor state.

Control word 0x6040

index 6040h	name	Control word control word			Set into effect	Operation setting With immediate effect	Data structure	VAR	Data type	Uint16
	accessibility	RW	Can map	RPDO	Correlation model	ALL	Data range	0-65535	Factory setting	0

Set control instruction:

BIT	name		description
0	off1 Start Stop control	Switch on	0- stop, 0->1 run
1	off2 Inertial shutdown	Enable voltage	0- valid, 1- invalid
2	off3 Quick shutdown	Quick stop	0- valid, 1- invalid
3	Custom run allows sources	Enable operation	0- Run not allowed. 1- Run allowed
4	Ramp function generator (RFG) prohibited source	operation mode specific	0: Disable. 1: Disable
5	Ramp function generator (RFG) suspend source	operation mode specific	0- Pause is valid. 1- Pause is invalid
6	The ramp function generator (RFG) is given as a 0 source	operation mode specific	0- Given 0 is valid, 1 given 0 is invalid
7	User-defined fault reset source 1	fault reset	0- invalid, 1- valid
8	pause	Halt	Not supported at present
11	Velocity inversion	ms-rd	0- invalid, 1- valid

Note:

Each BIT of the control word is meaningless and must be combined with others to form a control instruction. BIT8 is not supported yet.

Control word value (binary)	description
xxxx xxxx x111 1110	Initial startup preparation (or off1 shutdown)
xxxx 0xxx x111 1111	Motor start
xxxx 1xxx x111 1111	Motor reverse operation

Target velocity 0x6042

index 6042h	name	vl target velocity			Set into effect	Operation setting With immediate effect	Data structure	VAR	Data type	Uint16
	accessibility	RW	Can map	RPDO	Correlation model	ALL	Data range	0-65535	Factory setting	0

The object should point to the speed required by the system, and the value should be expressed in a user-defined unit of speed or revolutions per minute (rpm).

Positive values indicate positive and negative values indicate negative.

Status word 0x6041

Index 6041h	name	Status word status word			Set into effect	-	Data structure	VAR	Data type	UINT16
	accessibility	RO	Can map	TPDO	Correlation model	ALL	Data range	-	Factory setting	0

Feedback motor status:

BIT	name		description
0	Start-up preparation	Ready to switch on	0- Not ready to start. 1- Ready to start
1	Preparation for operation	Switch on	0- Not ready to run, 1- ready to run
2	run	Operation enabled	0- Not running, 1- running
3	failure	Fault	0- No fault. 1- No fault
4	Off2 is valid for shutdown	Voltage enabled	0-off2 is valid, 1-off2 is invalid
5	Off3 is valid for shutdown	Quick stop	0-off3 is valid, 1-off3 is invalid
6	Power-on lock	Switch on disabled	0- Power on lock, 1- power on lock
7	warning	Warning	0- No warning, 1- Warning
9	Control right	Remote	0- Remote control, 1- local control
10	Velocity arrival	Target reach	0- Velocity does not reach the comparison value. 1- Velocity reaches the comparison value
15	Reverse velocity	Manufacturer speed direction	0- forward, 1- reverse

Status word value (binary)	description
xxxx xxxx x000 0000	Drive not powered on (or not EtherCAT connected)
xxxx xxxx x011 0001	Ready for startup (or OFF1 shutdown)
xxxx xxxx x1xx xxxx	Power-on lock
xxxx xxxx x011 0111	run
xxxx xxxx x0xx 1xx1	Fault
xxxx 1xxx x011 0111	Reverse operation

Actual velocity 0x6044

Index 6044h	name	vl velocity actual value			Set into effect		Data structure	VAR	Data type	Uint16
	accessibility	RO	Can map	TPDO	Correlation model	ALL	Data range	0-65535	Factory setting	0
The object should point to the actual speed of the system.										

◆Custom mode (common communication mode)
In this mode, the motor is controlled by user-defined 0x4000 R-PZD.1~16.
The data is fed back to 0x4100 T-PZD.1 to 16.

index	Mode	Object
0x4000	Common communication mode	R-PZD1
		R-PZD2
		R-PZD3
		R-PZD4
		R-PZD5
		R-PZD6
		R-PZD7
		R-PZD8
		R-PZD9
		R-PZD10
		R-PZD11
		R-PZD12
		R-PZD13
		R-PZD14
		R-PZD15
		R-PZD16
0x4100	Common communication mode	T-PZD1
		T-PZD2
		T-PZD3
		T-PZD4
		T-PZD5
		T-PZD6
		T-PZD7
		T-PZD8
		T-PZD9
		T-PZD10
		T-PZD11
		T-PZD12
		T-PZD13
		T-PZD14
		T-PZD15
		T-PZD16

Note: In this mode, if you select Bonergy controller module, related parameters will be automatically connected.

ESI file

Please download from Boneng transmission official website, or contact the manufacturer.

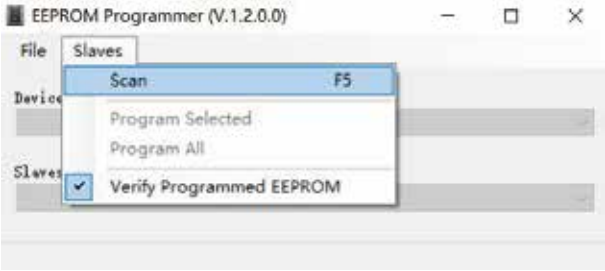
Boneng_AD_EC.xml is the device description file of Boneng driver.

ESI is abbreviated for "EtherCAT Slave Information", which records the inherent information of slave station, such as manufacturer information, product information, object dictionary, process data, synchronization mode, SyncManager Settings, etc.

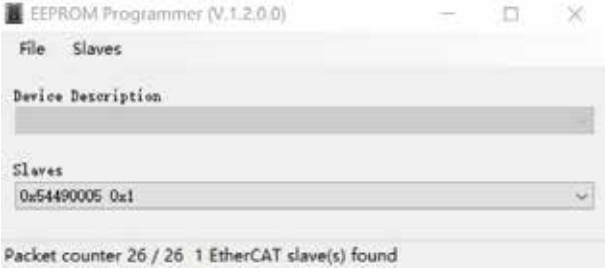
Device description file burning:

1. Double-click the EEPROM Programmer.exe program.

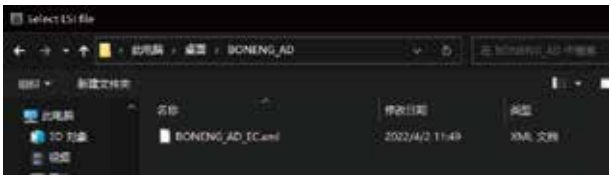
2.Click Slave to select Scan as shown in the figure:



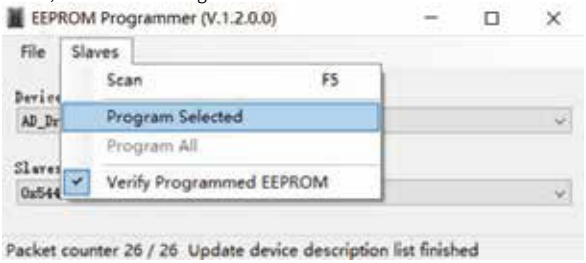
Selective Ethernet



3.Click File and select open to find the XML file. As shown below:



4.Click on Slaves and select Program selected, and then the Slaves will be displayed in E^2, as shown in the figure:

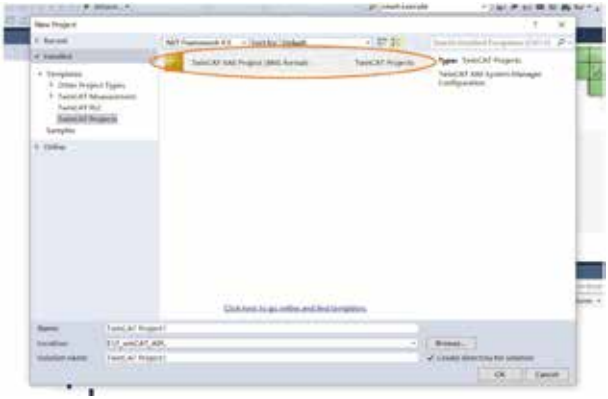


5.Wait for the burning to finish, as shown in the picture:

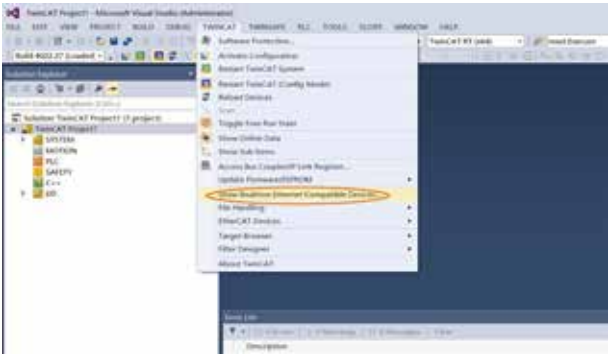
Note: The software will not respond during the burning process, this state is a normal phenomenon, do not need to do any operation.

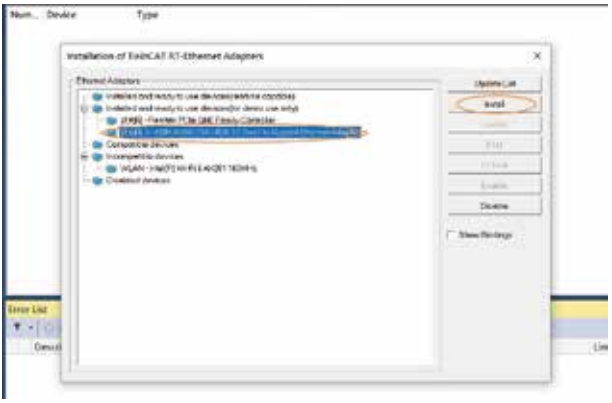
EtherCAT Application case
Cooperate with Befu embedded controller operation case

Local connection
1. Install the TwinCAT software.
2. Copy the Boneng_AD_EC configuration file (XML) to the TwinCAT installation directory..... \TwinCAT\3.1\Config\Io\EtherCAT
3. Open TwinCAT3 and create a new project.

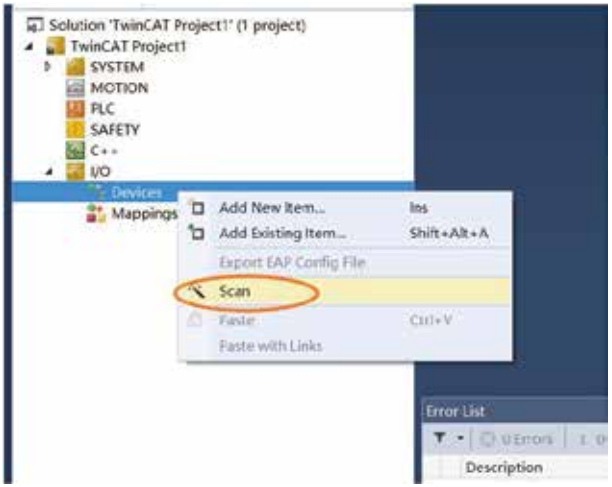


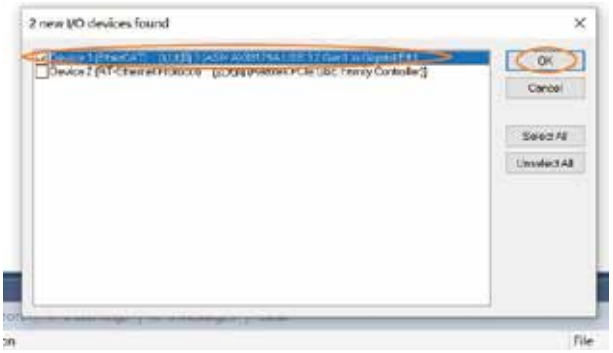
4. Install the TwinCAT NIC driver
As shown in the picture:

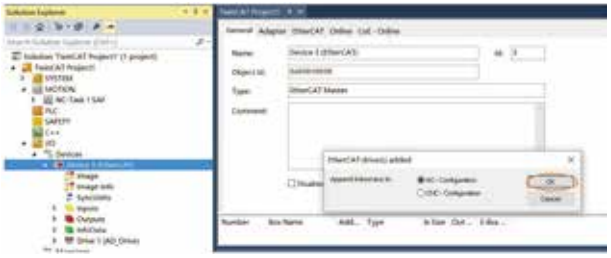




5.Search for devices

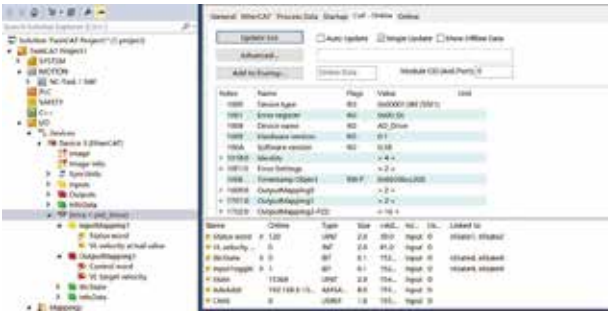




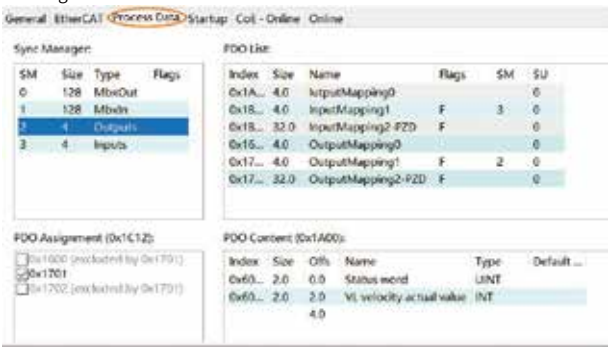


A device has been added. Procedure

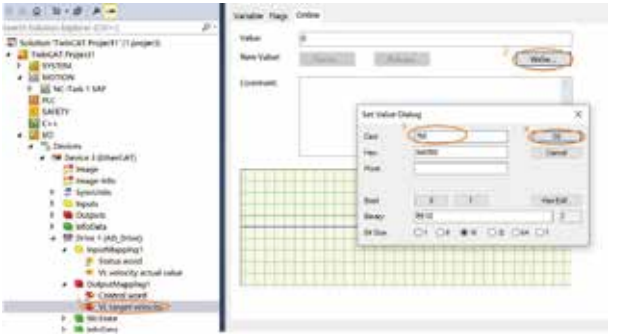
6.PDO configuration



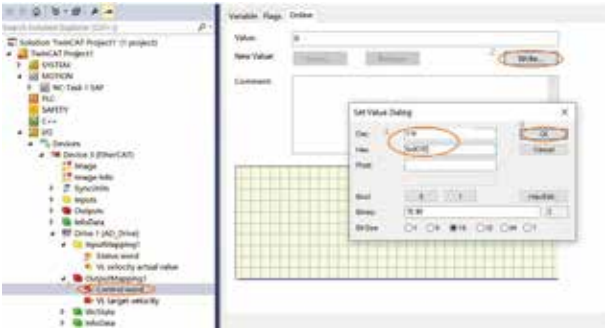
7.PDO configuration



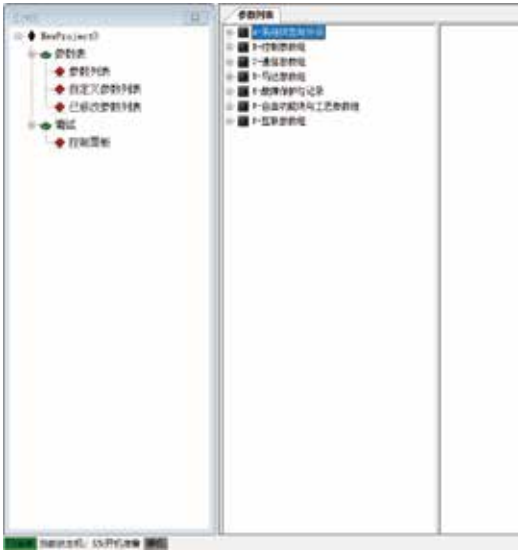
7. Set function code parameters (in CoE_VL mode)
Set the bus type of the C00.00 bus adapter to 5:EtherCAT;
A04.14 Drive mode Select 1:CoE_VL.
8. Set the target speed
Here set the target speed to 750rpm



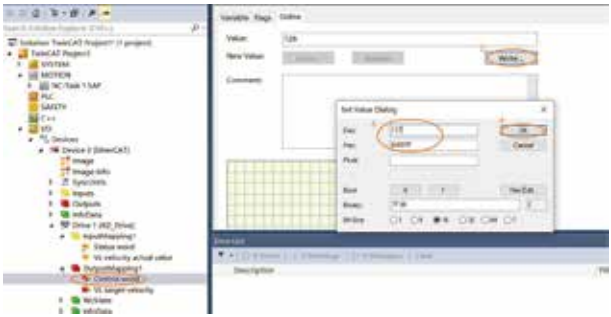
7. Set the command
1) Initialize the drive and write the control word to 0x7E



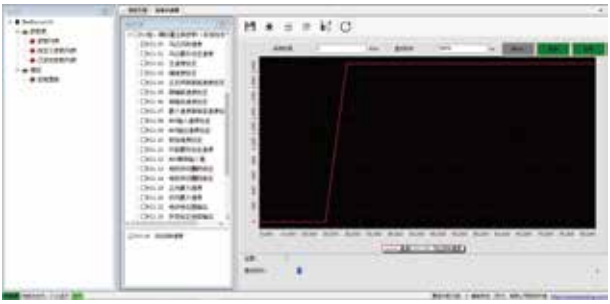
Drive status



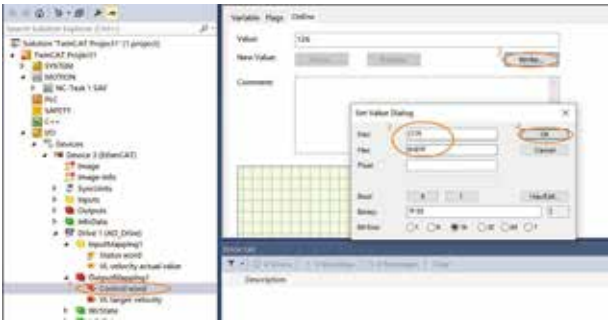
2) off1 Start command with control word written to 0x7F



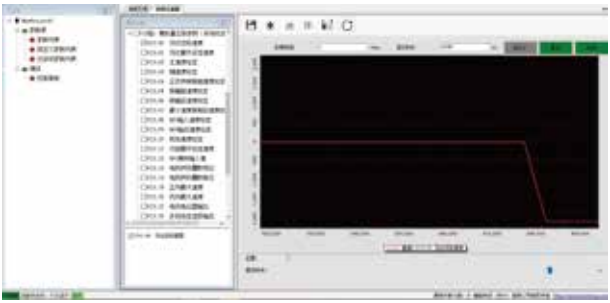
Motor operation



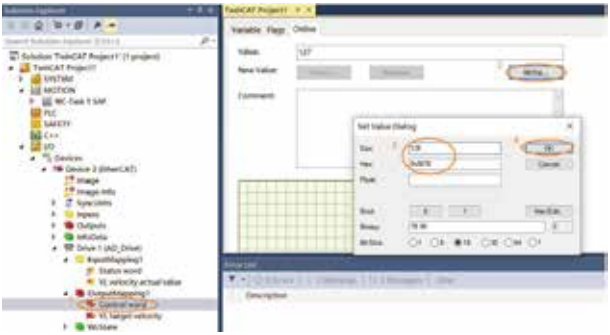
3) Run instruction in reverse, control word written to 0x87F



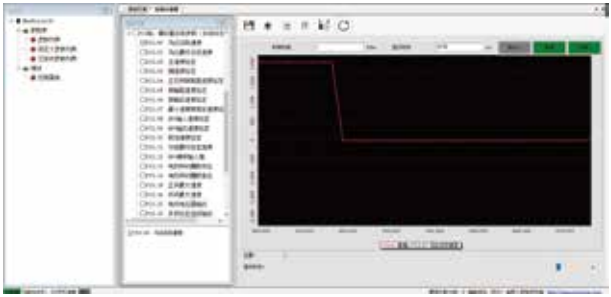
Motor reverse operation



4) Stop command, control word written to 0x7E



Motor shutdown



Object dictionary table

Index	Object name	Access authority	Data type	Unit	Ex-factory value
0x1000	Device type	RO/read-only	U32	-	0x00010192
0x1001	Error Register	RO/read-only	U8	-	0
0x1008	Manufacturer device name	RO/read-only	VS	-	"AD_Drive"
0x1009	hardware version	RO/read-only	VS	-	*
0x100A	software version	RO/read-only	VS	-	*
0x1018	Identity	RO/read-only	-	-	4
--SI0	Number of Entries	RO/read-only	U8	-	0
0	ID/Vendor ID	RO/read-only	U32	-	0
0	Product code	RO/read-only	U32	-	0
0	Reversion	RO/read-only	U32	-	*
0	Serial number	RO/read-only	U32	-	*
0x10F1	Error Setting	RO/read-only	-	-	0
--SI0	Number of Entries	RO/read-only	U8	-	0
0	Local Error Reaction	RO/read-only	U32	-	0
0	Sync Error Counter Limit	RO/read-only	U16	-	0
0x1600	Output Mapping 0			-	
--SI0	Number of Entries	ro,wr_preop	U32	-	2
0		ro,wr_preop	U32	-	0x60400010
0		ro,wr_preop	U32	-	0x60420010
0x1701	Output Mapping 1			-	
--SI0	Number of Entries	RO/read-only	U8		2
0		RO/read-only	U32	-	0x60400010
0		RO/read-only	U32	-	0x60420010
0x1702	Output Mapping 2			-	
--SI0	Number of Entries	RO/read-only	U8	-	16
--SI1~SI16		RO/read-only	U32	-	0x40000110~ 0x40001010
0x1A00	Input Mapping 0			-	
--SI0	Number of Entries	ro,wr_preop	U32	-	2
0		ro,wr_preop	U32	-	0x60410010
0		ro,wr_preop	U32	-	0x60440010
0x1B01	Input Mapping 1			-	
--SI0	Number of Entries	RO/read-only	U8		2
0		RO/read-only	U32	-	0x60410010
0		RO/read-only	U32	-	0x60440010
0x1B02	Input Mapping 2			-	
--SI0	Number of Entries	RO/read-only	U8	-	16
--SI1~ SI16		RO/read-only	U32	-	0x41000110~ 0x41001010
0x1C00	Sync Manager communication type				

Index	Object name	Access authority	Data type	Unit	Ex-factory value
--SI0	Number of Entries	RO/read-only	U8	-	4
0	Communication Type SM0	RO/read-only	U32	-	1
0	Communication Type SM1	RO/read-only	U32	-	2
0	Communication Type SM2	RO/read-only	U32	-	3
0	Communication Type SM3	RO/read-only	U32	-	4
0x1C12	SM2 PDO assignment				
--SI0	Number of Entries	RO/read-only	U8	-	1
0	1st PDO Mapping object index	RO/read-only	U16	-	1700h
0x1C13					
--SI0	Number of Entries	RO/read-only	U8	-	1
0	1st PDO Mapping object index	RO/read-only	U16	-	1B00h
0x4000	R-PZD				
--SI0	Number of Entries	RW/read-write	U8	-	16
--SI1~ SI16	R-PZD1~ R-PZD16	RW/read-write	U16	-	0
0x4100	T-PZD				
--SI0	Number of Entries	RO/read-only	U8	-	16
--SI1~ SI16	T-PZD1~ T-PZD16	RO/read-only	U16	-	0
0x603F	Error code	RO/read-only	UINT16	-	0x0000
0x6040	Control word	RW/read-write	UINT16	-	0x0000
0x6041	Status word	RO/read-only	UINT16	-	0x0000
0x6042	VL target velocity	RW/read-write	INT16	rpm	0x0000
0x6043	VL velocity demand	RO/read-only	INT16	rpm	0x0000
0x6044	VL velocity actual va	RO/read-only	INT16	rpm	0x0000
0x6046	VL velocity min max	RW/read-write		rpm	
--SI0	Number of Entries	RO/read-only	U8	-	16
0	VL velocity min amo	RW/read-write	UINT32	rpm	0x00000000
0	VL velocity max amo	RW/read-write	UINT32	rpm	0x000005DC
0x6048	VL velocity acceleration				
--SI0	Number of Entries	RO/read-only	U8	-	16
0	Delta speed	RW/read-write	UINT32	rpm	0x000005DC
0	Delta time	RW/read-write	UINT16	s	0x0005
0x6049	VL velocity deceleration				
--SI0	Number of Entries	RO/read-only	U8	-	16
0	Delta speed	RW/read-write	UINT32	rpm	0x000005DC
0	Delta time	RW/read-write	UINT16	s	0x0005
0x604A	VL velocity quick stop				
--SI0	Number of Entries	RO/read-only	U8	-	16
0	Delta speed	RW/read-write	UINT32	rpm	0x000005DC
0	Delta time	RW/read-write	UINT16	s	0x0005
0x605A	Quick stop option co	RW/read-write	INT16	-	0x0001
0x605B	Shutdown option co	RW/read-write	INT16	-	0x0001
0x6060	Modes of operation	RO/read-only	INT8	-	0x02
0x6061	Modes of operation	RO/read-only	INT8	-	0x02
0x6502	Supported drive mo	RO/read-only	UINT32	-	0x00000002

After–sale service

For the various kinds of transmission devices, if there is any quality problem, don ' t tear down components, you should illustrate the situation, then contact with after - sales department of the compant, confirm about the problems, then apply ideal method to deal with them.

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