

学习/培训文档

西门子自动化教育合作项目 (SCE) | 从 V14 SP1 开始

博途 (TIA Portal) 模块 062-101 通过 PROFINET 与 SIMATIC S7-1500 实现通信的变频器 G120

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感谢德累斯顿工业大学,特别是(工程博士)以及 Michael Dziallas 工程公司和所有参与支持编纂此份 SCE 教学资料的参与人员。

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变频器 G120,搭载控制单元 CU250S-2 PN Vector,通过 PROFINET 与 SIMATIC S7-1500 实现通信

1 目标

在这一章节中您将学习到,如何在使用 SIMATIC S7 控制器 - 例如通过 PROFINET 进行通信的 CPU1516F-3 PN/DP - 的情况下,将搭载有控制单元 CU250S-2 PN 的变频器 SINAMICS G120 投入运行。

此模块介绍了在博途 (TIA Portal) 中用 SINAMICS Startdrive 软件调试变频器 SINAMICS G120 的 相关信息。

之后还会逐步说明如何在 CPU1516F-3 PN/DP 的程序中控制和监控变频器 SINAMICS G120。可以使用第 3 章所列的 SIMATIC S7 控制器。

2 前提条件

此章节的基础是 SIMATIC S7 的全局数据块章节。学习本章内容时,可以参考以下项目: "SCE_EN_032-600_ Global_Data_Blockszap13"。

3 所需的硬件和软件

- **1** 工程组态站点:对硬件和操作系统有要求 (其他相关信息,参见博途 (TIA Portal) 安装 DVD 上的 Readme/自述文件)
- 2 博途 (TIA Portal) 中的软件 SIMATIC STEP 7 Professional V13 以上版本
- 3 博途 (TIA Portal) 中的软件 SINAMICS Startdrive V13 以上版本
- 5 变频器 SINAMICS G120, 搭载:
 - 控制单元 CU250S-2 PN, 固件 4.6 以上版本
 - 功率模块 PM240-2
 - IOP 智能操作面板
 - 异步电机
- 6 以太网连接:工程组态站点和控制器之间以及控制器和变频器之间



4 理论

4.1 变频器 SINAMICS G120

每台 SINAMICS G120 变频器均由一个控制单元 (CU) 和一个功率模块 (PM) 组成。

- 控制单元控制和监控功率模块和连接的电机。
- 功率模块则包含了功率范围为 0.37 kW 至 250 kW 的电机整流器和逆变器。



提示:

- 关于搭载控制单元 CU250S-2 PN 的变频器 G120 的详细信息,请参见手册。在此模块中,变频器 SINAMICS G120 用作 PROFINET-IO 设备。

4.2 变频器 SINAMICS G120 的组成部件

4.2.1 控制单元 CU250S-2



控制单元 CU250S-2 通过现场总线接口类型加以区分。控制单元 CU250S-2 分为以下几种:

- 适用于 USS、Modbus RTU 的 RS485 接口
- PROFIBUS 接口
- 适用于 PROFINET、Ethernet/IP 的 RS485 接口
- CANopen 接口

所有控制单元都配有一个 EEPROM,用以稳定地保存项目组态数据。

使用的控制单元 CU250S-2 Vector 配有一个包含两个端口的 PROFINET 接口,该接口支持 PROFIdrive、PROFIsafe 和 PROFIenergy 等协议。

此外,如 HTL 或 TTL 编码器和温度传感器都可直接连接至 15 针的编码器接口,带 DRIVE-CLiQ 功 能的编码器以及传感器模块可连接至控制单元的 DRIVE-CLiQ 接口。

控制单元支持**安全集成**(安全集成等级 SIL 3、性能等级 PL e、类别 3)的以下功能:

- 安全转矩切断 (Safe Torque Off, STO)
- 安全停止 1 (Safe Stop 1, SS1), 带和不带转速监控
- 安全制动控制 (Safe Brake Control, SBC)
- 安全限速 (Safely-Limited Speed, SLS)
- 安全方向 (Safe Direction, SDI)
- 安全转速监视器 (Safe Speed Monitor, SSM)
- 与上一级控制器之间的 PROFIsafe 通信

有多种控制方式可选,以满足对驱动技术的不同要求:

- U/f 特征曲线
- 磁通电流控制 (Flux Current Control)
- 带或不带编码器的矢量控制

该控制单元还有以下**特殊功能**可用:

- Epos 基础定位
- 通过高效馈电技术(仅功率模块 PM250)实现反馈

此外,还有带**数字量、模拟量**和**安全输入端和输出端**的端子可用。

4.2.2 操作面板

操作面板用于调试、诊断和控制变频器以及保存和传输变频器设置。



智能操作面板 (IOP) 可扣合在控制单元上,或用一根连接线连接至控制单元,用作手提式面板。通过 IOP 可对变频器进行操作和诊断。



BOP-2 是扣合在控制单元上的操作面板。**BOP-2** 的显示屏为两行,分别显示变频器的诊断和操作 信息。

提示:

- 关于操作面板的详细信息,请参见手册。

4.2.3 控制单元的存储卡(选配)

可选择 SD 或 MMC 存储卡来保存变频器设置。 最多可保存 100 个参数组。可通过软件 SINAMICS Startdrive 进行保存操作。 固件升级/降级也必须要借助存储卡来实现。

使用 Epos 基础定位功能或高级安全功能时,必须将带有有效许可证的存储卡插在控制单元上。

提示:

- 否则,在运行期间并不需要使用存储卡。

4.2.4 制动继电器 (Brake Relay)



制动继电器提供了一个转换接点(常开触点),用于控制电机制动器的线圈。

4.2.5 安全制动继电器 (Safe Brake Relay)



安全制动继电器可控制 24V 电机制动器,并监控制动器控制装置是否出现短路和断线。

4.2.6 功率模块 PM240-2

功率模块 PM240-2 配有制动斩波器(四象限应用),适用于常规机械制造中的多种应用。功率模块 PM240-2 有不配置滤波器或配有 A 级内置电源滤波器两种。



功率模块 PM240-2 有以下电压和功率范围可选:

- 200 V 240 V 单相交流/三相交流 0.55 kW 4.0 kW
- 200 V 240 V 三相交流 5.5 kW 7.5 kW
- 380 V 480 V 三相交流 0.55 kW 250 kW
- 500 V 690 V 三相交流 11 kW 132 kW

提示:

- 如果长时间不用变频器,应按照使用说明书中的规定对中间电路电容器充电。

4.2.7 功率模块 PM250

功率模块 PM250 适用的应用与 PM240 的一致。可能出现的制动能可直接反馈回电源(四象限应用-无需制动斩波器)。功率模块 PM250 有不配置滤波器或配有 A 级内置电源滤波器两种。



功率模块 PM250 有以下电压和功率范围可选:

• 380 V 三相交流 - 480 V ±10% 7.5 kW 至 90 kW

提示:

- 如果长时间不用变频器,应按照使用说明书中的规定对中间电路电容器充电。

4.2.8 电源滤波器



在电源滤波器的帮助下,变频器能达到更高的无线电抗干扰等级。已安装有电源滤波器的变频器无 需再配置外部滤波器。

4.2.9 进线电抗器



进线电抗器可提供超压保护,平滑电源中的谐波振动并消除整流干扰。

4.2.10 输出电抗器



输出电抗器通过线路中的容性电流降低电机绕组的电压负载和变频器的负载。如果是屏蔽的电机线,50 m 以上需要加输出电抗器,如果是非屏蔽,则 100 m 以上才需要加。

4.2.11 正弦滤波器



变频器输出端上的正弦滤波器用于限制电机绕组上的电压陡度和电压峰值。允许的最大电机线长度 提高到 300 m。不必加输出电抗器。

4.2.12 制动阻力



制动阻力通过较高的惯性矩实现对负载的快速制动。 功率模块通过内置的制动斩波器控制制动阻力。

4.3 安全措施与警告

安装和调试 SINAMICS G120 前需注意下列安全和警告提示。

4.3.1 常规信息

⚠ 警告

该设备带有危险电压,且会对旋转的机械部件施加控制作用,旋转的机械部件可能会造成危险情况。不注意本手册中的警告提示或不遵守其中的指示可能会危及生命、造成重伤或严重 财产损失。

仅在带等电位联接的区域和干燥的室内允许使用防止直接接触 SELV / PELV 的防护装置。如不满足上述条件,则需采取其它防电击的防护措施,如绝缘装置。

仅允许具有相应资质的人员在该设备上作业,即已事先掌握本手册中的所有安全指示、安装、操作和维护指示的人员。设备能够顺利安全的运行,取决于是否按照规定地执行搬运、安装、操作和维护工作。

即使变频器已停止运行,电源端子、直流端子和电机端子以及制动线缆和热敏电阻线缆也会导电。断开电源后至少等待5分钟,直至设备完成放电。然后才能执行安装作业。

严禁从电机侧断开电源;必须始终在变频器的电源侧断电。

连接变频器电源时需确保电机的接线盒已关闭。

如果在将某个功能从开启切换为关闭时 LED 或类似显示设备未亮起或激活,这并不意味着该 元件已关闭或已断电。

必须将变频器彻底接地。

在设备上建立或更改连接前必须先将其断电。

请确保针对正确的电源电压配置了变频器。不得将变频器连接至比其适配的电源电压更高的 电压。在非通用的接触面或接口(如端子或插销)上出现静态放电可能会造成设备故障或受 损。因此在执行与变频器或变频器组件有关的作业时,应采取静电敏感部件防护措施。

尤其需要注意关于在带危险电压的设备上作业的通用和当地适用的安装和安全规定(如 EN 50178),以及关于正确使用工具和个人防护装置 (Personal Protective Equipment, PPE)的相关规定。

▲ 小心

禁止儿童和其它未经授权的人员操作设备! 该设备仅可用于制造商规定的用途。未经许可更改和使用非设备制造商销售或推荐的备件和附 件可能会导致火灾、电击和人身伤害。

▲ 注意

此手册需保存在设备附近,确保所有用户均能轻松取用。 如须在导电设备上进行测量或测试,则务必遵守安全准则 BGV A2 中的规定,尤其是第 8 条 "在导电部件上作业时允许出现的偏差"。必须使用合适的电子工具。 在安装和调试前请仔细阅读这些安全指示和警告,以及设备上张贴的警告牌。请确保警告牌清 晰可读,如缺失或受损须立即予以更换。

4.3.2 运输与存放

▲ 警告

为确保设备安全且正确地运行,必须正确运输、正确存放并且谨慎地操作和维护。

运输和存放期间,需避免设备受到机械撞击和震动。防止设备进水(淋雨)以及避免将其置于 极端温度环境中。

4.3.3 调试

▲ 警告

无资质的人员在设备上作业或不注意警告可能会导致人员受重伤或遭受严重的财产损失。仅可由已熟知设备组装、安装、调试和运行等相关知识的有资质的人员在设备上作业。

企小心

电缆连接

控制线必须与供电电缆分开敷设。必须按照此手册"安装"一节中的说明进行连接,这样才能 避免因感应和容性干扰影响到设备的正常运行。

4.3.4 运行期间

/ 警告

变频器 SINAMICS GI20 借助高电压工作。

电气设备运行时,设备的特定部件上必然会存在危险电压。

因此,在控制装置的所有运行模式下,急停装置都必须能够符合 EN 60204、IEC 204 (VDE 0113)的规定正常发挥作用。急停装置关闭不得导致设备出现意外或未知的重新启动。

特定的参数设置可能会导致变频器 SINAMICS G120 在断电后自动重新启动,如自动重启功 能。

在如出现故障则会导致严重财产损失甚至人员重伤的控制装置范围内,必须额外采取外部预防 措施或安装装置,确保在出现问题时也能保证安全运行(如独立的限位开关、机械锁定装置 等)。

电机参数的配置必须精准,确保电机过载保护能够顺利起效。

该设备的设计可确保实现符合 UL508C 标准的内部电机过载保护。

仅可使用将故障安全功能作为"急停机制"的控制单元(参见 EN 60204,章节 9.2.5.4)。

4.3.5 维修

仅可由西门子客户服务部、西门子授权的维修中心或熟知本手册中的所有警告提示和工作指示 的授权专业人员在设备上进行维修作业。 所有受损部件或组件必须更换为相关备件清单中的部件。 打开设备接触内部部件前,必须先断开电源。

4.3.6 拆卸与废弃处理

⚠∿小心

变频器的包装可回收利用。妥善保管包装,以便日后使用。 由于包装采用的是便于松开的螺栓和卡扣连接,因此可拆分成零碎的包装件。这些零碎的包装 件可再次利用、按照当地适用的规定进行废弃处理或退给制造商。

提示:

 接下来描述的操作步骤和任务以与异步电机预装配完成的变频器单元为基础。在进行电气安装 时请注意制造商的安全规定和警告提示。针对设备安装和电气安装的提示和指令请参见 SINAMICS G120 的手册。

4.4 变频器 SINAMICS G120 参数设置

参数的主类型有两种:

- 监测参数
- 设置参数

4.4.1 监测参数

通过监测参数可读取变频器和电机的内部测量变量。操作面板和 SINAMICS Startdrive 显示的测量 参数带有前缀 "r",如 r0027 即变频器输出电流的参数。

4.4.2 设置参数

通过设置参数可根据应用调整变频器。更改设置参数会导致变频器的性能也发生改变。设置参数的 前缀是"p",如 p1082 即电机最大转速的设置参数。

接下来会为您介绍一些特别重要的设置参数。

提示:

- 关于这些参数的详细信息请参见列表手册。

4.4.3 P0010 驱动器调试参数筛选

参数 P0010 筛选出那些被归为特定功能组的参数。这样一来便可在例如快速调试时按照顺序显示 调试所需的参数。有下列设置可用:

• P0010 = 0: 就绪

如需起动变频器,必须将 P0010 设置为 0

- P0010 = 1: 快速调试
- P0010 = 2: 功率件调试
- P0010 = 3: 电机调试
- P0010 = 4: 编码器调试
- P0010 = 5: 技术应用/单元
- P0010 = 11: 功能模块
- P0010 = 15: 数据组
- P0010 = 17: 基础定位调试
- P0010 = 25: 位置控制调试
- P0010 = 29: 仅西门子内部人员
- P0010 = 30: 参数重置
- P0010 = 39: 仅西门子内部人员
- P0010 = 49: 仅西门子内部人员
- P0010 = 95: 安全集成调试

将 p3900 设置为 0 以外的值将结束快速调试,之后该参数自动设置为 0。

4.4.4 P0015 宏驱动单元

借助参数 P0015,可通过执行相应的宏文件选择变频器的指令源和额定值源。

更改值后,只要宏仍在执行,就无法再更改参数。在 r3996 中会显示状态。仅当 r3996 = 0 时才可再次进行更改。

在执行某一特定的宏时,经过相应编程的设置便会开始作用并生效。

例如, 宏7: "带数据组切换的现场总线"



提示:

- 关于其它宏的信息请参见相应的控制单元的使用说明。

4.4.5 取决于变频器状态的可更改性

"P"参数的可更改性依赖于变频器的状态。

如,参数 p1120 斜坡发生器加速时间(在参数列表中的属性为 "C(1), U, T")仅在快速调试 "C"(当 P0010 = 1 时)、在就绪状态 "T"或运行 "U"时可更改。

状态	描述
C(*)	快速调试 (P0010 = *)
U	运行(驱动器运行中)
Т	驱动器处于启动就绪状态

4.4.6 BICO 技术

一台具有最新技术状态的变频器,必须能够实现内部和外部信号(额定值或实际值和控制信号以及 状态信号)的自由连接。

这种连接必须有很高的灵活度,才能随时随地根据新的应用要求对变频器做出简单的调整。

为满足这些要求要用到 BICO 技术和宏。

通过 BICO 技术,可在使用变频器"标准"参数的情况下将过程参数自由连接。

此时,可自由连接的所有值被定义为"模拟量互联",如频率额定值、频率实际值、当前实际值等。

而可自由连接的所有数字量信号被定义为"二进制互联",如某一数字量输入端的状态、 ON/OFF、超出/低于某一限值时的消息功能等。

变频器中存在大量的输入量和输出量以及控制器内部的量,这些量都可相互连接。这样一来,就可 借助 BICO 技术根据不同的要求调整变频器。

二进制互联

二进制互联是没有单位的数字量(二进制)信号,可赋值 0 或 1。二进制互联始终涉及到功能。二进制互联分为二进制互联输入 (BI) 和二进制互联输出 (BO) 两种。

二进制互联输入始终带有"P"参数标识(如 P0840 BI: ON/OFF1),二进制互联输出始终带有 "r"参数标识(如 r1025 BO: FF 状态)。

示例

将指令 ON/OFF1 与固定频率的选择相组合。



选择固定频率时,固定频率状态位 (r1025) 在内部从 0 设置为 1。

指令 ON/OFF1 的来源是参数 P0840(标准 DI0)。如果连接固定频率状态位,将其作为 P0840 (P0840 = 1025)的来源,那么激活一个固定频率便会启动变频器,而在禁用固定频率时便会通过 OFF1 停止变频器。

模拟量互联

模拟量互联(16 位或 32 位)包含一个值,该值可能是一个标准化的量(没有尺度),也可能是一个带有单位的量。

模拟量互联始终涉及到功能。模拟量互联分为模拟量互联输入 (CI) 和模拟量互联输出 (CO) 两种。 模拟量互联跟二进制互联从根本上是一样的:模拟量互联输入始终带有 "P"参数标识(如 P0771 CI: AO(模拟量输出),模拟量互联输出始终带有 "r"参数标识(如 r0021 CO: 实际频率)。

示例

连接参数 r0755(显示模拟量输入)和内部值(主频率额定值)。为此,必须将 CO 参数 r0755 (定标的模拟量输入)与 CI 参数 P1070(主额定值)连接起来。



提示:

- 其它详细信息请参见列表手册。

4.4.7 指令数据组 (CDS) 和驱动数据组 (DDS)

在驱动技术中存在运行期间需要通过外部信号同时切换多个参数的应用。

为了实现这样的需要,需要事先将特定的参数汇总到组中。这些所谓的数据组分为:

- 指令数据组 (CDS, Control Data Set)
- 驱动数据组 (DDS, Drive Data Set)
- 提示:

- 其它详细信息请参见列表手册和使用说明。

4.5 调试变频器 SINAMICS G120

G120 型变频器始终由功率模块和控制单元组成。首次将控制单元插接在功率模块上并且开启电源 后,控制单元会识别功率模块。如果是可兼容的功率模块,就会将数据保存在控制单元中。

变频器 G120 的调试通常分为以下步骤:

- 重置为出厂设置
- 基础调试

- 快速调试

- -计算电机/控制数据
- -优化转速控制
- 调试的其它设置
 - -选配: 电机数据识别
 - -调试应用
 - -调试故障安全功能(仅针对故障安全应用)

4.5.1 通过重置参数恢复出厂设置

可通过软件 SINAMICS Startdrive、通过智能操作面板 (IOP) 中的菜单功能或直接输入参数进行出 厂设置。

"重置参数"的方法:

p0010 = 30

p0970 = 1

p0970=0 在计算结束时自动设置。

```
通过 P0970 进行出厂设置,可将所有变频器参数恢复为原始值。这些值在列表手册中被标上了 "出厂设置"(Factory Setting)。
```

在重置为出厂值时,下列参数保持不变:

- P0014 存储器模式
- 通信参数(如现场总线和 PROFINET 设置)
- 取决于功率模块的数据

4.5.2 基础调试

基础调试应通过软件 SINAMICS Startdrive 或智能操作面板 (IOP), 始终在调试向导的指引下完成。

或者也可以选择直接输入参数执行快速调试 (P0010 = 1)。但不推荐使用这种方法。

提示:

- 通过软件 SINAMICS Startdrive 在调试向导的指引下进行调试的信息请参见本文档的第6章。
- 通过智能操作面板 (IOP) 在调试向导的指引下进行调试的信息请参见 IOP 的使用说明。

4.6 SINAMICS G120, CU250S-2 PN Vector 的 PROFINET 接口



通过带 P1 和 P2 两个端口的 PROFINET 接口 X150 可将变频器连接至以太网网络。此时可:

- 通过以太网借助软件 SINAMICS Startdrive 在博途 (TIA Portal) 中实现变频器的参数化设置和诊断。
- 将变频器集成到 PROFINET 网络中。

在 PROFINET IO 运行中,变频器支持下列功能:

- IO-RT: 实时通信(跟此文档中所使用的一样。)
- IO-IRT: 等时实时通信
- MRP: 介质冗余, 在采用环型拓扑结构的网络中使用时
- MRPD: 介质冗余的前提: 等时实时通信, 在采用环型拓扑结构的网络中使用时
- 与 PROFIdrive 协议中确定的故障等级一致时的诊断警报

4.6.1 报文

对于与变频器的 IO-RT 通信,有不同的报文可选,它们的过程数据长度和内容都不同。 最简单的、已设为标准的报文是标准报文 1。

4.6.2 通过标准报文 1 分配 SINAMICS G120 的过程数据 (PZD)

控制字和额定值 (PLC -> SINAMICS) 或状态字和实际值 (SINAMICS -> PLC) 可以随着过程数据进行传输。针对通过 PROFINET 实现的耦合,过程数据 (PZD) 范围的构成在报文 1 中如下所示:

	PZD1	PZD2
任务报文	控制字	主额定值
(PLC -> SINAMICS)	(STW1)	(NSOLL_A)
应答报文	状态字	主实际值
(SINAMICS -> PLC)	(ZSW1)	(NIST_A)

4.6.3 控制字 1 (STW1)

			STW HSW	
位编	号	5 14 13 1	2 11 10 9 8 7 6 5 4 3 2 1 0	
位	含义 报文 20	所有其它报文	注释 交频器中 信号连接	的
0	0 =OFF1		电机按照斜坡发生器的斜坡下降时间参数 P0840[0] p1121 进行制动。在停转后,变频器关闭 r2090.0	=
	0 → 1 = ON		变频器进入状态"运行就绪"。如果额外的 位 3 = 1 ,变频器开启电机。	
1	0 = OFF2 1 = 无 OFF2		立即关闭电机,然后电机减速停转。 P0844[0] 可开启电机 (ON 指令)。 r2090.1	=
2	0 = 快速停车 1 = 无快速停2	(OFF3) 年 (OFF3)	快速停车:电机按照 OFF3 的斜坡下降时间 p1135 进行制动,直至停转。 P0848[0] r2090.2 可开启电机(ON 指令)。 P0848[0]	=
3	0 = 运行阻止 1 = 运行使能	(0.1.0)	立即关闭电机(删除脉冲)。 P0852[0] 开启电机(可发出脉冲使能)。 =r2090.3	
4	1 = 217 Q ft 0 = 阻止斜坡が 1 = 不阻止斜坡が	发生器 波发生器	交频器立即将斜坡发生器输出设为 0。 p1140[0] 可发出斜坡发生器使能。 r2090.4	=
5	0=斜坡发生器 1=斜坡发生器	器停止 器使能	斜坡发生器输出保持在当前值。 P1141[0]= 斜坡发生器输出依照额定值。 r2090.5	
6	 0 = 额定值阻」 1 = 额定值使能 	E.	变频器按照斜坡发生器的斜坡下降时间参数 p1121 制动电机。 P1142[0]= r02090.6 电机按照斜坡上升时间参数 p1120 加速至额 cf r02090.6	
7	0→1=应答ī	坎 障	定值。 应答故障。如果仍然存在"ON"指令,变频 p2103[0] = 器进入"阻止开机"状态。 r2139.7	
8、9 10	备用 0 = 不通过 PL 1 = 通过 PLC	C 控制 控制	变频器忽视来自于现场总线的过程数据。 P0854[0]= 通过现场总线进行控制,变频器接收来自现 r2090.10 场总线的过程数据。	
11	1 = 换向		转速大于或等于相应的最大转速。 p2080[10]= r2199.1	
11	1 = 换向		转换变频器中的额定值。	=
12	未使用			
13	1)	1 = MOP 提高	电机电位计中保存的额定值提高。 P1035[0] r2090.13	=
14	1)	1 = MOP 降低	电机电位计中保存的额定值降低。 P1036[0]= r2090.14	
15	CDS 位 0	备用	在小同操作接口的设置之间转换 (指令数据组)。 P0810 r2090.15	=

1) 如果从一封报文转换到报文 20, 之前报文保持占用状态。

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4.6.4 状态字 1 (ZSW1)

			ZSW HIW	
位编	号	14 13 12	11 10 9 8 7 6 5 4 3 2 1	0
位	含义 报文 20	所有其它报文	注释	变频器中的信 号连接
0	1 = 开机就绪		电源已开启,电子装置已初始化,脉冲已 阻止。	P2080[0] = r0899.0
1	1 = 运行就绪		电机已开启 (ON/OFF 1 = 1),无故障激活。 变频器通过指令"运行使能"(STW1.3)开启 电机。	p2080[1] = r0899.1
2	1 = 运行已使能		电机依照额定值。参见控制字 1, 位 3。	p2080[2] = r0899.2
3	1 = 故障		变频器中出现故障。通过 STW1.7 应答故障。	p2080[3] = r2139.3
4	1 = OFF2 未激活		减速至停转未激活。	p2080[4] = r0899.4
5	1 = OFF3 未激活	1	快速停车未激活。	p2080[5] = r0899.5
6	1 = 开机阻止激活	e 1	只有在 OFF1 重新 ON 后才可开启电机。	p2080[6] = r0899.6
7	1 = 警告有效		电机保持开启;无需应答。	p2080[7] = r2139.7
8	1=转速偏差在公	差范围内	额定值/实际值偏差在公差范围内。	p2080[8] = r2197.7
9	1 = 已请求控制		自动化系统已请求承担变频器的控制任务。	p2080[9] = r0899.9
10	1=达到或超过对	计比转速	转速大于或等于相应的最大转速。	p2080[10] = r2199.1
11	1 = 达到电流 或力矩极限	1 = 达到力矩 极限	达到或超过电流或力矩极限对比值。	p2080[11] = r0056.13 / r1407.7
12	1)	1 = 抱闸打开	用于打开和关闭电机抱闸的信号。	p2080[12] = r0899.12
13	0=电机超温警告	Ī	_	p2080[13] = r2135.14
14	1 = 电机右转	0=电机左转	变频器内部实际值 > 0。 变频器内部实际值 < 0。	p2080[14] = r2197.3
15	1 = 显示 CDS	0 = 变频器热 过载警告		p2080[15] = r0836.0 / r2135.15

1) 如果从一封报文转换到报文 20, 之前报文 保持占用状态。

4.6.5 主额定值(HSW/NSOLL_A; 16 位)



主额定值为16位字,用于将所需转速传输至变频器。

额定值以带符号的整数(-32768 至 32767)传输。值 16384 (4000 Hex) 对应 +100%。

借助参数 P2000(基准转速)将值 100% 规定为某个特定的转速。在此参数中输入的转速,即是通过接口传输给变速器的 100% 额定值。

变频器转速按照如下方式计算:

n= (HSW x P2000)/16384

提示:

 执行电机调试时将针对驱动数据组 0 自动计算参数 P2000(基准速度),并设为参数 P1082 (最大转速)的值。

4.6.6 主实际值(HIW/NIST_A; 16 位)



主实际值为 16 位字,可用于传输变频器实际转速。该值的标准化设置与额定值相同。

n= (HIW x P2000)/16384

提示:

- 执行电机调试时将针对驱动数据组 0 自动计算参数 P2000(基准速度),并设为参数 P1082 (最大转速)的值。

4.6.7 采用双字格式的任务报文的排列方式

任务报文以双字格式发送至 SINAMICS G120。 位的排列方式可参考表格。

	控制字												主额定值																		
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	AB 256 AB 257											A	B 2	258						Α	Β	25	59								
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

4.6.8 采用双字格式的应答报文的排列方式

应答报文以双字格式从 SINAMICS G120 发回。 位的排列方式可参考表格。

	状态字												Š字 主实际值																		
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	EB 256 EB 257									EB 258 EB 259																					
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

提示:

- 在控制程序中使用一个数据块为任务报文和应答报文缓存数据。在那里,数据借助 PLC 数据 类型形成报文,并分别映射到某个结构。

4.7 SINAMICS G120 的调试工具 SINAMICS Startdrive

调试软件 SINAMICS Startdrive 可在网页中下载最新版本:

support.industry.siemens.com .

SINAMICS Startdrive 是一款集成在博途 (TIA Portal) 中的工具,在结构和操作上与现有的博途 (TIA Portal) 相一致。

SINAMICS Startdrive 的扩展包包含已支持的变频器 SINAMICS G120 的数据和视图。

因此,通过该工具可以方便地为变频器进行参数化设置并将其投入运行。在诊断和查找故障方面提 供大量的功能和辅助设置。

4.7.1 重置变频器并设置 IP 地址

变频器控制单元可以直接利用博途 (TIA Portal) 中的 SINAMICS Startdrive 获得一个新的 IP 地址。现在可以重置控制单元。

→ 为此,请双击调用博途 (TIA Portal)。(→ TIA Portal V13)



→ 之后,请选择菜单项 → "在线 & 诊断" (Online & Diagnostics) 并就此打开 → "项目视图" (Project view)。

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→ 在项目导航中的 → "在线访问" (Online access) 下选择计算机网卡。单击 → "刷新可连接的 节点" (Update accesible devices),即可看见已连接的 SINAMICS G120 变频器的控制单元的 IP 地址(如果已设置)或 MAC 地址(如果尚未分配 IP 地址)→ 请选择 → "在线 & 诊断" (Online & Diagnostics)。



→ 重新分配 IP 地址之前,建议先重置 PROFINET 接口参数。为此,请选择功能 → "重置 PROFINET 接口参数" (Resetting the PROFINET interface parameters) 并点击 → "重置" (Reset)。

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→ 出现询问是否确实需要重置时,单击 → "是" (Yes) 确认



→ 重置成功后,会有一条消息出现在窗口 → "信息" (Message) → "常用" (General) 中。

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	The device was reset.			8/31/2016	1:04:09 PM	
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→ 之后再次→"刷新可连接的节点"(Update accesible devices),并选取所需变频器的→"在 线 & 诊断"(Online & Diagnostics)。现在请选择功能→"分配 IP 地址"(Assign IP address)。请在此位置输入例如以下 IP 地址: → IP 地址 (IP adress): 192.168.0.6 →子网掩 码 (Subnet mask): 255.255.255.0。现在单击 → "分配 IP 地址"(Assign IP address),即可 为变频器控制单元分配此新地址。

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Dell Wireless 1550 802.11ac			Use router
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PC internal [Local]			
PLCSIM [PN/IE]	-?		Assign IP address
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→ 成功分配 IP 地址后,会有一条消息出现在 → "信息" (Message) → "常用" (General) 中。

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→ 在将变频器重置为出厂设置之前,必须再次 → "刷新可连接的节点"(Update accesible devices)并选取所需变频器的 → "在线 & 诊断"(Online & Diagnostics)。如需将变频器重置 为出厂设置,请在 → "备份/重置"(Backing up/reset)下选择 → "重置为出厂设置"(Restore factory resetting)并单击 → "启动"(Start)。



Restore	e factory setting	Þ		
▲	Do you really want to restore the factory setting?			
	Save factory setting in EEPROM			
	OK Cancel			

提示:

- 将变频器重置为出厂设置时,IP 地址和子网掩码等通信设置将予以保留。

5 任务要求

下文的描述,是以"SCE_EN_032-600_Global_Data_Blocks"一章中的项目为基础,加上了带控制单元 CU250S-2 PN 的变频器 G120。

之前通过模拟值控制皮带电机,现在由通过 PROFINET 控制变频器取代。通过 PROFINET 还可以监控转速实际值。

6 规划

由异步电动机驱动的输送带现在将通过速度可变的变频器控制。

此变频器必须在项目中创建、参数化设备和投入运行。

可利用软件 SINAMICS Startdrive 在调试向导的指引下为变频器进行离线参数化设置。

对此,可应用异步电机铭牌上的电机数据并手动输入。

在此项目中,以下异步电动机以三角形电路连接,并以 230V 单相电压运行。



图 1: 异步电机铭牌

在大多数电机中, 接线盒顶盖内侧绘制有两种电路类型的示意图:

- •星形电路 (Y)
- 三角形电路 (Δ)



变频器 SINAMICS G120 接下来通过 PROFINET 收到 SIMATIC S7-1500 的启动指令和规定转速。而 转速实际值可以通过 PROFINET 从变频器 SINAMICS G120 读出,并在 SIMATIC S7-1500 中对上下 极限进行监控。

在控制程序中创建一个数据块"FREQUENCY_CONVERTER"[DB4],为任务报文和应答报文缓存相关数据。在数据块中,数据借助 PLC 数据类型形成报文,并分别映射到某个结构。

在组织块"Main"[OB1]中,将变频器实际值复制到数据块"FREQUENCY_CONVERTER" [DB4]中并将数据块中的额定值复制到变频器中。

最后,在调用功能和功能块时可访问数据块 "FREQUENCY_CONVERTER" [DB4] 中创建的数据。

6.1 技术示意图

请在此位置查看任务要求的技术示意图。



图 3: 技术示意图

Schalter der Sortieranlage		Automatikbetrieb		Handbetrieb / Manual mode
Switches of sorting station		Automatic mode		-S3 Tippbetrieb -M1 vorwärts/
-P1 ein/on		-P5 gestartet/started		- Manual -M1 forwards
-Q0 Hauptschalter/Main switch		S1 Start/start		-S4 Tippbetrieb -M1 rückwärts/
-P4 aktiviert/active				Manual -M1 backwards
-A1 NOTHALT/Emergency stop		-S2 Stopp/stop		-P7 ausgefahren/extended
		02 00pp/stop		-S6 Zylinder -M4 ausfahren/
-P2 Hand/manual -P3 Auto/auto				cylinder -M4 extend -P6 eingefahren/retracted
-S0 Betriebsart/operating mode				-S5 Zylinder -M4 einfahren/
			l	- cylinder -M4 retract
			L	

图 4: 操作面板

6.2 分配表

在该任务中需要使用以下信号作为全局操作数。

DI	类型	标识	功能	NC/NO
1 0.0	BOOL	-A1	报告急停 ok	NC
I 0.1	BOOL	-K0	设备 "ON"	NO
10.2	BOOL	-S0	运行选择开关手动 (0)/自动 (1)	手动 = 0 自动 = 1
1 0.3	BOOL	-S1	自动模式启动按键	NO
10.4	BOOL	-S2	自动模式停止按键	NC
I 0.5	BOOL	-B1	"气缸 -M4 已缩回" 传感器	NO
I 1.0	BOOL	-B4	"滑道已占用"传感器	NO
I 1.3	BOOL	-B7	"有部件在输送带末端"传感器	NO
ED256	STRUCT	PZD_IN_G120_01	报文1从输送带1的G120接收过程数据	

DO	类型	标识	功能	
AD256	STRUCT	PZD_OUT_G120_01	报文1将过程数据发送至输送带1的G120	

分配列表图例

- DI
 数字量输入
 DO
 数字量输出
- AI 模拟量输入 AO 模拟量输出
- 1 输入
 O 输出
- NC 常闭触点 (Normally Closed)
- NO 常开触点 (Normally Open)

7 结构化分步指导

以下是帮助您实现规划的引导指南。如果您已经掌握了相关的知识,只需要使用带标号的步骤标题 作为参考。否则,也可以简单地跟随指南中的图示一步步操作。

7.1 恢复现有项目

→ 在 扩 展 " SCE_EN_032-600_Global_Data_Blocks " 一 章 中 的 项 目 "SCE_EN_032-600_Global_ Data_Blocks _R1508.zap13"之前必须恢复此项目。恢复现有 项目时必须在 → 项目 (Project) → 恢复 (Retrieve) 下的项目视图中找到相应文档。接着点击打 开您的选择。(→ 项目 (Project) → 恢复 (Retrieve) → 选择 .zap-Archivs → 打开)



→ 接下来,您可以选择用来保存恢复项目的目标目录。点击确定 (OK) 确认选择。 (→目标目录→确定 (OK))
→ 以"062-101 Frequency converter G120 and S7-1500"为名保存打开的项目。 (→ 项目 (Project) → 另存为 (Save as...) → 062-101 Frequency converter G120 and S7-1500 → 保存)



7.2 在博途 (TIA Portal) 中创建变频器

→ 要将 SINAMICS G120 的控制单元与 CPU1516F-3 PN/DP 进行联网,必须切换到"网络视图" (Network view)。在该位置可以将所需的"CU250S-2 PN Vector"用鼠标拖放到网络视图 (Network view)。

(→ 设备和网络 (Devices & networks) → 网络视图 → 驱动器和启动器 (Drives & starters) → SINAMICS 驱动器 (SINAMICS drives) → SINAMICS G120 → 控制单元 (Control units) → CU250S-2 PN Vector → 产品编号 (Article no.): 6SL3246-0BA22-1FA0 → 版本 (Version) 4.7)。

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Traces				CU240E-2 PN		a
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→ 现在请用鼠标将 G120 的控制单元与 CPU1516F-3 PN 通过以太网接口相连。(→ 📅 以太网

\rightarrow	以太网)

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→ 接着在 "G120" 的 "PROFINET 接口 [X1]" (PROFINET interface [X1]) 下的属性 (Properties) 中 设置与 CPU 相匹配的 IP 地址。

(→G120 CU250S-2 PN Vector → PROFINET 接口 [X1] (PROFINET interface [X1]) → 属性 (Properties) → 以太网地址 (Ethernet addresses) → IP 协议 (IP protocol) → IP 地址 (IP address): 192.168.0.6)

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Device proxy data	General	interface networked with				CU240E-2 F	
PLC alarms	Ethernet addresses	Subnet	PN/IE 1			a CU240E-2	
Text lists	Cyclic data exchange	Subict				€ CU240E-2	
Local modules	Actual value		Add new subnet			CU2505-2 V	
Distributed I/O	Setpoint					a CU2505-2 C	-
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Documentation settings		IP address:	192.168.0.0		✓ Informa	tion	
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	 Port [X1 P2] 		0 10 10 10				
	Diagnostics addresses	PROFINET				100	
	Module parameter	- HOT HEL				CUDEOS 2 PNIV	Voc
	HW identifier		Generate PROFINET device name automat	ically		C02505*2 PN V	, ec
		PROFINET device name	drive_1		Article no.:	65L3246-0BA22	2-1F
		Converted name:	drivexb14fe3				
<	-	Device system	1		Version:	4.7.3	~
> Details view		Device number:	1		<		>

→ 在"常用"(General) 下为设备命名。 (→ 常用 (General) → 设备名 (Name): Drive_G120_Conveyor)

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Watch and force tables			berues sinto Diagr	losues	-	CU240B-2 DP	
Online backups	General					CU240E-2	- 1 -
Traces	- General	Conorol		^		CU240E-2 PN	ask
Program info	Catalog information	General				CU240E-2 D	~ · · ·
Device proxy data	 PROFINET interface [X1] 					CU240E-21	
PLC alarms	General	Name:	Drive_G120_conveyor			CU240E-2	
I ext lists	Ethernet addresses	Author:	Michael Dziallas			CU2505-2 V	bra
Local modules	 Cyclic data exchange 	Comment-	[CU2505-2 C	. Irie
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Card Reader/USB memory	Synchronization						
-	Port [X1 P1]	Catalog information					
	Port [X1 P2]						
	Diagnostics addresses						
	Module parameter	Short designation:	CU250S-2 PN Vector			CU2505-2 PN V	ec
	HW identifier	Description:	Control Unit type: CU250S-2 PN Vec	tor 🔨			
< III >			Analog inputs: 2	~	Article no.:	6SL3246-0BA22-	16
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提示:

 在 "G120 CU250S-2 PN Vector"的 "PROFINET 接口" (PROFINET interface) 中,菜单项 "PROFINET"下的名称栏会自动应用 PROFINET 设备名。 → 也可以为该设备设置 "IO 周期环" (IO cycle), 如 "更新时间" (Update time) 和 "响应监控时 间" (Watchdog time)。

(→扩展选项 (Advanced options) → 实时设置 (Real time settings) → IO 周期 (IO cycle) →
更新时间 (Update time) → 响应监控时间 (Watchdog time))

Mi Siemens - D:\00_TIA_Portal\062-101Freque	ency Converter G120 PN S7-1500\062-10	01 Frequeny Converter G120 PN S7-1500		_ ¤ ×
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Technology objects		CPU1516F.PROFINE		SINAMICS G1
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	Port [X1 P2]	Watchoog une. 0.000		
	Diagnostics addresses			
	Module parameter			CU2505-2 PN 1
	HW identifier			
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→ 针对 PLC 和变频器之间的"周期性数据交换"(Cyclic data exchange) 规定使用"标准报文 1" (Standard Telegram 1)。

(→ PROFINET 接口 [X1] (PROFINET interface [X1]) → 周期性数据交换 (Cyclic data exchange) → 实际值 (Actual value):标准报文 1 (Standard Telegram 1) → 额定值 (Setpoint):标准报文 1 (Standard Telegram 1))

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 Lag Card Reader/USB memory 	Synchronization								
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	 Port [X1 P2] 								
	Diagnostics addresses	> Actual value							
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→ 针对地址范围,选择"E 256...259"和"A 256...259"。

(→ PROFINET 接口 [X1] (PROFINET interface [X1]) → 周期性数据交换 (Cyclic data exchange) → 实际值 (Actual value) → 开始地址 (Start address) I 256 → 额定值 (Setpoint) → 开 始地址 (Start address) O 256)



→ 现在从 "Drive_G120_Conveyor" 切换至 "设备视图" (Device view)。在设备视图中可以选择 使用的电源模块,例如: "PM240-2 IP20 FSA U 1/3 AC200 0.75kW",并分配给 "Drive_G120_Conveyor"。

(→ 设备视图 (Device view) → Drive_G120_Conveyor → PM 240-2 IP20 FSA U 1/3 AC200 0.75kW)





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(→ CPU_1516F [CPU1516F-3 PN/DP] → 🛄)



→ 现在必须为作为 CPU_1516F 之 IO 设备的变频器 G120 分配设备名。为此首先选中网络 "PN/IE_1", 然后选择"分配设备名"(Assign device name)。 (

→ PN/IE_1 → 分配	设备名 (Assign	device name))
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→ 在接下来的对话框中可以先选择 "PG/PC 接口 (PG/PC interface)",之后再选择 "drive_g120_conveyor"和 "分配设备名" (Assign device name)。

(→ PROFINET 设备名 (PROFINET device name): drive_g120_conveyor → SINAMICS G120 CU250S → 分配名称 (Assign device name))

Assign PROFINET device	e name.							×
		Configured I	PROFINI	ET dev				
				drive a120-ce	onvevor		-	
		Devi	ice type:	CU250S-2 PN V	ector			
		Online						
		Type of the PG/PC in	nterface:	PN/IE			•	
		PG/PC ir	nterface:	💹 Intel(R) Ether	net Connectio	n I217-LM	•	Q
		Device filter						
		Only show	devices of t	ne same type				
		Only show	devices with	bad parameter	r settings			
		Only show	devices with	iout names				
	Accessible devic	es in the network						
	IP address	MAC address	Device	PROFINET device	ce name	Status		
	192.168.0.6	00-1F-F8-E0-4E-5	SINAMICS.		4	No device n	ame assigned	
Flash LED								
	<							>
					Updat	e list	Assign na	me
Online status information:								
Search completed.	1 of 2 devices we	re found.						
Search completed.	1 of 2 devices we	re found.						
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							Close	
Assign PROFINET device	e name.		_					×
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提示:

- 如网络中有多个 IO 设备,可以根据压印的 MAC 地址识别设备。

→ 如组件显示过多,可以单击"仅显示同类型设备"(Only show devices of the same type) 筛选 视图。如设备名分配成功,将在状态栏 (Status) 中显示"OK"。(→关闭 (Close))

Assign PROFINET device nam	ne.								×
		Configured I	PROFINE	T dev					
		PROFINET devic Devi	e name: ice type:	drive_g120_c 202505-2 PN \	onveyor /ector		•		
		Online acces Type of the PG/PC ir PG/PC ir	SS nterface:	PN/IE	rnet Connection I217-LN	M	•	و چ	
		Device filter							
		Only show	devices of th	e same type					
		Only show	devices with	bad paramete	er settings				
		Only show	devices with	out names	-				
Acce	assible devic	es in the network							
IP ad	ddress	MAC address	Device		PROFINET device name		Status		
192	2.168.0.6	00-1F-F8-E0-4E-5	SINAMICS G	120 CU250	drive_g120_conveyo	r 🕑	ОК		
Elash LED									
						_			
					Update list		Assio	n name	
Online status information:									
 Search completed. 1 of 2 	devices we	re found.							
 Search completed. 1 of 2 	devices we	re found.							
The PROFINET device name	me "drive_g	120_conveyor" was s	successfully a	ssigned to M	AC address "00-1F-F8-	E0-4	E-5E".		
٢									>
							0	lose	

7.3 用调试向导为变频器进行参数化设置

→ 要为变频器进行参数化设置,双击 "Drive_G120_Conveyor"的"参数"(Parameter),打开 参数,然后启动"调试向导"(Commissioning Wizard)。

(→ Drive_G120_Conveyor → 参数 (Parameter) → 调试向导 (Commissioning Wizard))

M Siemens - D:\00_TIA_Portal\062-101Frequency Conve	ter G120 PN S7-1500062-101 Frequeny Converter G120 PN S7-1500	_ = ×
Project Edit View Insert Online Options Tools	Window Help Totally Integra	ted Automation
📑 📑 🔚 Save project 🔳 🐰 🯥 🛍 🗙 🏷 ± (주 ±	🖥 🛄 🔛 🎇 💋 Go online 🖉 Go offline 🍦 🖪 🔚 🥵 🚍 🛄	PORTAL
Project tree 🔲 🖣	/ Converter G120 PN S7-1500 🔸 Drive_G120_conveyor [G120 CU250S-2 PN Vector] 🔸 Parameter 💦 🗕 🖬 🗮 🗙	Tasks 📑 🔳 🕨
Devices	Wizards Functional View Parameter View	Options 💽
B C O B		Tas 🗆
	▼ Commissioning	✓ Find and re
 062-101FrequencyConverter G120 PN S7-1500 	Drive connected to a SIMATIC motion control	
Add new device	Commissioning Wizard	Find:
Devices & networks		bra
CPU1516F [CPU1516F-3 PN/DP]		Whole words
Device configuration		Match case
2 Parameter		Find in substr
n Commissioning		Find in hidder
Coline & diagnostics		
🕨 🔄 Traces		
 Common data 		Use regular ex
Documentation settings		O Whole docum
Languages & resources		From current
Gard Reader/USR memory		O Selection
Card Readendsb memory	Drive_G120_conveyor [G120 CU250S-2 PN Vector] 💁 Properties 🚺 Info 🗓 Diagnostics 📑 🖶 💌	O Sciection
	General	Own
	Advanced options	O Up
	Media redundancy > Setpoint	Fir
	← Real time settings	Realise with
	IO cycle Drive Partner	
Dotails view	Synchronization Name Drive_G120_convey CPU1516F	
		Languages
Portal view 🖸 Overview 🔐 Param	eter V The PROFINET device name	"drive_g12

→ 在随后的对话框中选择"具有线性特性的 U/f 控制"(U/f control with linear characteristic) 作为 控制类型。保留功能模块的默认选择。

(→具有线性特性的 U/f 控制 (U/f control with linear characteristic) → 下一步 (Next))

Commissioning Wizard	? X
	Open-loop/closed-loop control type Specification of the open-loop/closed-loop control type according to the load characteristic and open-loop/closed-loop control task
Open-loop/closed-lo	Function modules:
Defaults of the setpo	Techn controller
Drive setting	Basic positioner
Drive setting	Free function blocks
Motor	
Important parameters	Setpoint [0] U/f control with linear characteristic
Drive functions	
Encoders	
Summary	M
	A section of the s

→ 在选择额定值和命令源时,选择宏 7 "带数据组切换的现场总线" (Fieldbus with data set changeover)。(→[7] 带数据组切换的现场总线 (Fieldbus with data set changeover))



→ 选择宏 "[7] 带数据集切换的现场总线" (Fieldbus with data set changeover) 时必须点击 "应 用" (Accept) 确认。 (→ 应用 (Accept))

Commissioning Wizard	? 🗙
	Defaults of the setpoints/command sources Selection of a predefined interconnection of the inputs/outputs and, if required, the fieldbus telegram. Can be changed later user-specifically.
 Open-loop/closed-lo Defaults of the setpo Drive setting Motor Important parameters Drive functions Encoders Summary 	Current I/O configuration: [7] Fieldbus with data set changeover Select the default of the I/O configuration: [7] Fieldbus with data set changeover Image: Select the default of the I/O configuration: [7] Fieldbus with data set changeover Image: Select the default of the I/O terminals are deleted and reconnections to the I/O terminals are deleted and reconnections of the I/O terminals are deleted I/O configuration. Accept Selected interconnections of the I/O terminals: D10: p1055[1] Bi: Jog bit 0 D11: p1055[1] Bi: Jog bit 1 D2: p2103[1] Bi: Jog bit 0 D11: p1055[1] Bi: Jog bit 1 D2: p2103[1] Bi: Jacknowledge faults p2104[0] Bi: Z Acknowledge faults D3: p810 Bi: Command data set selection CDS bit 0 D0 0: r52.3 CO/BO: Status word 1::Fault present A0 0: r21 CO: Actual speed smoothed A0 1: r27 CO: Absolute actual current smoothed A0 1: r27 CO: Absolute actual current smoothed Mo1: r27 CO: Absolute actual current smoothed Mo1: r27 CO: Absolute actual current smoothed
	<< Back Next>> Finish Cancel

→ 现在将显示 I/O 端子与宏 7 的当前连接。 (→下一步 (Next))

Commissioning Wizard	? ×
	Defaults of the setpoints/command sources Selection of a predefined interconnection of the inputs/outputs and, if required, the fieldbus telegram. Can be changed later user-specifically.
Open-loop/closed-lo Defaults of the setpo Drive setting	Current I/O configuration: [7] Fieldbus with data set changeover Select the default of the I/O configuration:
Motor	Note: If changed, all the existing drive-internal interconnections to the I/O terminals are deleted and reconnected in accordance with the selected I/O configuration.
 Important parameters Drive functions Encoders Summary 	Current interconnections of the I/O terminals: DI0: p1055[1] BI: Jog bit 0 D1: p1056[1] BI: Jog bit 1 D2: p2103[1] BI: 1. Acknowledge faults p2104[0] BI: 2. Acknowledge faults D13: p810 BI: Command data set selection CDS bit 0 D14: - D15: - D15: - D16: - D17: - D17: - D00: r52.3 CO/BO: Status word 1::Fault present D01: r52.7 CO/BO: Status word 1::Pault present D02: r52.2 CO/BO: Status word 1::Pault present D03: r52.2 CO/BO: Status word 1::Pault present D04: - D17: -
	Current telegram configuration: [1] Standard telegram 1, PZD-2/2 <<< Back Next >> Finish Cancel

→ 在驱动器设置中选择 "IEC 电机 (50Hz, SI 单元)" (IEC-Motor (50 Hz, SI units)) 和 "矢量 驱动的高过载负荷周期" (Load duty cycle with high overload for vector drives)。
 (→ IEC 电机 (50Hz, SI 单元) (IEC-Motor (50 Hz, SI units)) → 矢量驱动的高过载负荷周期

(Load duty cycle with high overload for vector drives) \rightarrow 下一步 (Next))

Commissioning Wizard						? X
	Drive Selection	e setting n of motor standard and load cycle				
 Open-loop/closed-lo Defaults of the setpo Drive setting Motor 	Standarc [0] IEC-M Drive un Power un	d: Motor (50 Hz, SI units) it line supply voltage: 230 V nit application:				
	[0] Load	I duty cycle with high overload for vector o	drives			-
Important parameters	·	p205: Power unit application				
 Drive functions Encoders 	T P o b %∡b	The duty cycles can be overloaded provided that the drive converter is operated with its base load current sefore and after the overload. This is pased on a load duty cycle of 300 s.				
Summary	200- C 150- h	Default value: [0] Load duty cycle with nigh overload for vector drives				
	100-	Options:				
	50-	 [0] Load duty cycle with high overload for vector drives [1] Load duty cycle with low overload for vector drives Help for the parameter 	:0	240	300	t(s)
	<< Bi	ack Next>>	[Finish	C	ancel

提示:

- 关于设置的详细信息请参见工具建议文本框、在线帮助或列表手册。

→ 在接下来的对话框中选择"异步电动机"作为电机类型,并根据电机铭牌的说明输入电机数据 (→ 输入电机数据 (Enter motor data) → 异步电动机 (Induction motor) → 连接方式 (Connection type): 三角形 (Delta) → ... → 下一步 (Next))

Commissioning Wizard				? X
	Motor Specification of	of motor type and motor data		
 Open-loop/closed-lo Defaults of the setpo Drive setting Motor Important parameters Drive functions Encoders Summary 	Specification of Motor configu Enter motor d Select motor t [1] Induction r Select the con Delta Motor data Parameter p304[0] p305[0] p307[0] p307[0] p308[0] p310[0] p311[0] p335[0]	f motor type and motor data ration ata ype notor nection type for your motor and 87 Hz ope rection type for your motor and 87 Hz ope rection type for voltage Rated motor voltage Rated motor voltage Rated motor power factor Rated motor power factor Rated motor frequency Rated motor requency Rated motor speed Motor cooling type tor connection	eration: Motor 87 Hi Value 230 0.73 0.750 50.00 1350.0 0] Non-ventil N	vms Arms kW Hz rpm umber: 1
	<< Back	Next >>	Finish	Cancel

提示:

- 也可以直接通过订货号选择 SIEMENS 电机。
- → 接下来的截图展现了电流/转速限制参数和斜坡发生器的示例。 (→下一步(Next))

Commissioning Wizard	? X
	Important parameters Specification of the most important dynamic response data
𝞯 Open-loop/closed-lo	Set the values for the most important parameters:
✓ Defaults of the setpo	Current limit: 1.10 Arms
	Minimum speed: 0.000 rpm
Interest Motor	Maximum speed: 500.000 rpm Ramp-function generator
Important parameters	ramp-up time: <u>3.000</u> s Ramp-function generator
Drive functions	ramp-down time: 3.000 s
Encoders	OFF3 ramp-down time: 1 s
Summary	
	<< Back Next >> Finish Cancel

→ 在技术应用栏 (Technology application) 选择"标准驱动" (Standard drive)。阻止 (inhibited) 电 机识别并选择"完整计算" (Complete calculation),基于之前的参数值计算接下来的 设置。

(→标准驱动 (Standard drive) → 电机识别 (Motor identification): 已阻止 (Inhibited) → 完整 计算 (Complete calculation) → 下一步 (Next))

Commissioning Wizard		? X
	Drive functions Specification of the method to measure the motor data	
 Open-loop/closed-lo Defaults of the setpo Drive setting Motor Important parameters Drive functions Encoders Summary 	Technology application [0] Standard drive A motor identification is recommended for the first commissioning. Stationary measurement is recommended for VIf and vector control. Stationary measurement and rotating measurement are recommended for vector control (only rotating measurement is not sufficient). Motor identification: [0] Inhibited Calculation of the motor parameters No calculation Image: Complete calculation Image: Construction of the calculation of the motor, open-loop control and closed-loop control parameters depending on the entered motor data.	•
	<< Back Next >> Finish Car	ncel

→ 在此位置不要选择编码器。(→下一步 (Next))

Commissioning Wizard		? ×
	Encoders	
 Open-loop/closed-lo Defaults of the setpo Drive setting Motor Important parameters 	Encoder selection	Encoder 2
 Drive functions Encoders Summary 	<< Back Next >>	Finish Cancel

→ 在随后的总结 (Summary) 中,所有设置将再次显示以进行检查。按下"完成"(Finish) 按钮应 用这些设置。(→完成 (Finish))

Commissioning Wizard		? X
	Summary Please check the entered data and complete the configuration	
 Open-loop/closed-lo Defaults of the setpo Drive setting Motor Important parameters Drive functions Encoders Summary 	The following drive data has been entered: Function modules: Techn controller: Yes Basic positioner: No Extended messages/monitoring: Yes Free function blocks: No Open-loop/closed-loop control type: Open-loop/closed-loop control operating mode: [0] Ulf control with linear characteristic Defaults of the setpoints/command sources: Macro drive unit: [7] Fieldbus with data set changeover Drive setting: IEC/NEMA mot stds: [0] IEC-Motor (50 Hz, SI units) Drive unit line supply voltage: 230 V Power unit application: [0] Load duty cycle with high overload for vector drives Motor: Motor type selection: [1] Induction motor Motor 87 Hz operation: No Number of motors connected in parallel: 1 Rated motor voltage: 230 Vrms Rated motor power. 0.73 Arms Rated motor power facto: 0.750 Rated motor speed: 1350.0 rpm Motor cooling type: [0] Non-ventilated	
	<< Back Next>> Finish Cance	•

→ 在将参数加载到"Drive_G120_Conveyor"" L "之前,再次保存项目。 (→ Save project → Drive_G120_Conveyor → L))

Mission Dito://initial/062-101Frequency Converter G120 Project Edit View Insert Online Options Tools Window Image: Display the project Image: Display the project	PN 57-1500/062-101 Frequeny Converter G120 PN 57-1500 Help Totally Integr	_ □ X ated Automation PORTAL
Project tree Down	l <mark>oad to device</mark> PN S7-1500 🔸 Drive_G120_conveyor [G120 CU250S-2 PN Vector] 🔸 Parameter 👘 💻 🖬 🗮 🗙	Tasks 📑 🗉 🕨
Devices	Wizards Functional View Parameter View	Options 🛃
Oc2-101FrequencyConverter G120 PN 57-1500 Add new device Devices & networks Grut516F [CPU 1516F-3 PNDP] Device configuration Prameter Commissioning Online & diagnostics GTraces Documentation settings	Commissioning Drive connected to a SIMATIC motion control Commissioning Wizard	Find and re Find: Whole words Match case Find in substr Find in substr Find in hidder Use regular es Whole docum
Contraction of the sources	<	 From current
Card Reader/USB memory	Drive_G120_conveyor [G120 CU250S-2 PN Vect Q Properties 1 Info 2 Diagnostics F = General	 Selection Down
> Details view	Advanced options Media redundancy Real time settings IO cycle Synchronization Port [X1 P1] ✓	Up Fir Replace with: ✓ Image: Second sec

→ 在以下对话框中选择 "PN/IE" 作为 PG/PC 接口类型 (Type of the PG/PC interface),随后将 之前设置的网卡作为 PG/PC 接口 (PG/PC interface) 并将 "PN/IE_1" 作为 CPU 到子网的连 接 (Connection to interface/subnet)。现在单击 "启动搜索" (Start search)。

(→ PG/PC 接口类型 (Type of the PG/PC interface): PN/IE → PG/PC 接口 (PG/PC interface): → 到子网的连接 (Connection to interface/subnet): PN/IE_1 → 启动搜索 (Start search))

	Device	Device type	Slot	Туре	Address	Subnet
	Drive_G120_conveyo			S7USB		
		CU250S-2 PN Vec.	0 X1	PN/IE	192.168.0.6	PN/IE_1
	Ту	pe of the PG/PC inter	face:	PN/IE		•
		PG/PC inter	face:	Intel(R) Et	hernet Connection I217	7-LM 🔽 🤇
	Conne	ection to interface/su	bnet:	PN/IE 1		- (
		1st aste				
	Compatible devices in	target subnet:				
	Compatible devices in	target subnet:			· · ·	
	Compatible devices in Device	Device type	Туре		Address	Target device
	Compatible devices in Device 	Device type	Type PN/IE		Address Access address	Target device
	Compatible devices in Device	Device type	Type PN/IE		Address Access address	Target device
M	Compatible devices in Device	Device type	Type PN/IE		Address Access address	Target device
Elash I ED	Compatible devices in Device	Device type	Type PN/IE		Address Access address	Target device
Flash LED	Compatible devices in Device	target subnet: Device type	Type PN/IE		Address Access address	Target device
Flash LED	Compatible devices in Device	target subnet: Device type 	Type PN/IE		Address Access address	Target device
Flash LED	Compatible devices in Device	target subnet: Device type 	Type PN/IE		Address Access address	Target device
Flash LED	Compatible devices in Device	target subnet: Device type 	Type PN/IE		Address Access address	Target device
Flash LED	Compatible devices in Device	target subnet: Device type	Type PN/IE		Address Access address	Target device
Flash LED	Compatible devices in Device	target subnet: Device type	Type PN/IE		Address Access address	Target device

 → 接着,就可以查看 "SINAMICS 驱动器" (SINAMICS drive) 并选择其作为目标设备了。然后 单击"加载" (Load)。 (→ SINAMICS 驱动器 (SINAMICS drive) → 加载 (Load))

xtended download	to device							
	Configured ac	cess nod	es of "Drive_G120_	conve	yor"			
	Device		Device type	Slot	Туре	Address	Subnet	
	Drive_G120_	conveyo			S7USB			
			CU250S-2 PN Vec.	0 X1	PN/IE	192.168.0.6	PN/IE_1	
		ту	pe of the PG/PC inte	rface:	PN/IE		•	
			PG/PC inte	rface:	💹 Intel(R) Eth	ernet Connection I217-LI	v ▼) 🖲 🧕
		Conne	ection to interface/su	bnet:	PN/IE_1		•	۲
			1st gat	eway:				۲
	Device	Device t	/pe		Туре 🔺	Address	Target	device
	Compatible de	evices in	target subnet:			Show an compatio	ie devices	
	Antrieb G1	G120 C	U2505-2 PN Vector	V4 7	PN/IE	192 168 0 6		uevice
100					PN/IE	Access address		
Flash LED								
							<u>Start</u>	search
Online status informatio	n:							
 Scan completed. 1 	compatible devic	es of 2 a	ccessible devices fo	und.				^
Retrieving device in	nformation							
Scan and information	on retrieval comp	leted.						~
Display only error m	nessages							
						Load	<u>C</u> a	ncel

→ 现在将自动编译配置,加载前再次显示概览,以检查要执行的步骤。现在选择"■将参数化设置备份到 EEPROM" (Save the parameterization in the EEPROM),并单击"加载" (Load)
 (→ ■ 将参数化设置备份到 EEPROM (Save the parameterization in the EEPROM) → 加载 (Load))

tatus	1	Target	Message	Action
+I	0	 Drive_G120_conveyor 	Ready for loading.	
	0	 Parameter assign 	Please note the following information:	
	0	EEPROM	Save the parameterization in the EEPROM after the download	Save the parameterization in the EEPROM

提示:

- 建议将参数备份到 EEPROM,这样在停电时也不会丢失参数

7.4 用控制面板测试和调试变频器

→ 为便于在没有 PLC 程序的情况下测试之前的参数化设置,请从 "Drive_G120_Conveyors"的
 "调试" (Commissioning) 菜单中打开"控制面板" (Control panel)。然后,单击
 "I Go online"。(→ Drive_G120_Conveyor → 调试 (Commissioning) → 控制面板 (Control panel)) (→ I Go online)

Project Edit View Insert Online Options Tools Window Help Totally Int Save project 🚊 🗶 🗐 🚡 X 🔩 🖉 X 🗳 👘 🔲 🖸 🔯 🖉 Go online 🖉 Go online 🖉 Go online 🖉 Go online	tegrated Automation
Project tree II 4 062-101 Frequence the verter G120 PN 52-1500 > Drive G120 conveyor [G120 CU2505-2 PN Vector) > Commissioning	- 2 5 X 4
	Tas
Commissioning Operating mode: Ope	Switch on:
> Image: Card ReaderLSB memory Drive status: Prevention (Construction on a construction on a construc	Arms Hz Vrms
Details view	iagnostics
🖣 Portal view 📧 Overview 🎊 Parameter 👫 Commissioni	fore download.

→ 在控制面板中,首先必须"激活"(Activated)"主控制"(Master control)。接着监控 PC 和变频器之间的通信。需要至少每隔 10000ms 进行一次成功的通信。否则,电机将停止,使能将重置。(→主控制 (Master control): [●] Activated → 10000ms → ^{Continue})



 → 要启动电机,首先必须使驱动器使能置位
 ✓ Set
 。一般情况下,置位自动完成。接着, 我们就可以开启驱动器了
 . (→ 开启

M Siemens - D:\00_TIA_Portal\062-101Frequency Converter G	120 PN \$7-1500\062-1	01 Frequeny Converter G120 PN S7-1500		_ = ×
Project Edit View Insert Online Options Tools Wind	low Help			Totally Integrated Automation
📑 📑 🔚 Save project 🚐 💥 🏥 🖆 🗙 🐑 ± (== ± 🖷 [0 II 8 🖬 🖉 😡	online 🖉 Go offline 🔚 📑 🐺 😽 🚽 📗		PORTAL
Project tree	062-101Frequency	Converter G120 PN \$7-1500 > Drive G120 conveyor [G120 Cl	1250S-2 PN Vector 1 Commissioning	
Devices				¥
				aş l
	 Commissioning 	Control panel		~ ×
• 062-101FrequencyConverter G120 PN S7-1500	Commissioni			
Add new device	Control panel			
Devices & networks	Motor opti	▲ Control p	banel active: Stop with spacebar	br
CPU1516F [CPU 1516F-3 PN/DP]	Backing up/			17.
Drive_G120_conveyor [G120 C0250S-2 PN \		Master control: Drive enables:	Operating mode:	Switch on: "
Device configuration		Notivated Deactivate Set	Speed specification	
28 Parameter				/
Commissioning		Modify:		
G Online & diagnosucs				
Common data		Speed: 0 🗢 rpm 🔳 St	op 🛛 🚽 Backward 📄 🕨 Forward	
Documentation cottings		44 10	a backward	
Languages & recourses		(AA)	,	=
Caligoages & resources				
Card Reader() ISB memory			A short set of a set	
Card Readenoss memory	-	Drive status:	Actual values:	
		Ready for switching on Operation enabled	Speed: 0.0 rpm M.	current: 0.00 Arms
		🔿 Fault 🔁		
		U Hom		
		Active fault:	Output frequency smoothed	▼ 0.0 Hz
		Acknowledge faults	Output voltage smoothed	▼ 0.0 Vrms
	<	<	Ш	
> Details view			9 Properties 1 In	fo B Diagnostics
	A Commissioni		S Properties Sin	io o biognosacs
Pontal View 🖸 Overview 🕼 Parameter	TA Commissioni		🗸 Conn	ected to Drive_G120_conveyor, a

运转。

→ 现在电机可以以所选的转速 (Speed) ► Forward 或 ▲ Backward

M Siemens - D:100_TIA_Portal1062-101 FrequencyConverter G120 PN S7-1	1500/062-101 Frequeny Converter G120 PN 57-1500	_ = ×
Project Edit View Insert Online Options Tools Window Help	🔐 🖉 Goonline 🖉 Gooffline 🛔 🖪 🕼 🗴 🖃 🛄	Totally Integrated Automation PORTAL
Project tree 🛛 🗸 062-101F		_ # = × (
Devices Devices Occurrent of 120 PN 57-1500 Occurrent of 120 Conveyor (C120 CU2505-2 PN Occurrent of 120 Conveyor (C120 CU2505-2 PN Occurrent of 120 Conveyor (C120 CU2505-2 PN Occurrent of 120 Convegor (C120 CU2505-2 PN Occurrent of 120 CU25	sioning missionin, of ganeer roptim, Master control: Cactivated Deactivate Modify: Speed: 14 Organ Stop Forward Stop Forward Stop The Stop Master Control: Speed: 14 Organ Stop Master Control: Drive enables: Stop Reset Stop Master Control: Stop Master Control: Modify: Speed: 14 Organ	Switch on:
Control Security Cont		urrent: 0.28 Ams

062-101Frequenc	yConverter G120 PN S7-1500 → Drive_G120_conveyor [G120 CL	250S-2 PN Vector] + Commissioning	
 Commissioning 	Control papel		^
Commissioni Control panel			
Motor opti	Control p	anel active: Stop with spacebar	
Backing upi	Master control: Drive enables:	Operating mode: Switch Speed specification	on:
	Modify:		
	Speed: 💶 🗢 rpm 🔳 St	op ABackward Forward	
	ot 🏓	g backward Dog forward	≡
	Drive status:	Actual values:	
	Ready for switching on Operation enabled	Speed: 0.0 rpm M. current: 0.28 Arr	ns
	🗢 Fault 🔼		
	Active fault:	Output frequency smoothed Output frequency smoothed Output frequency smoothed Output frequency smoothed	
	Acknowledge faults	Output voltage smoothed	ns 🗸
<	<.	III	>

→ 点击" Continue "	,确认禁用时弹出的安全询问。(→ Continue)	
Ng Siemens = DX00_TIA_Portal/052-101 Frequency/converter G1 Project Edit View Insert Online Options Tools Wind Project tree Devices Project tree Devices Insert Online Options Tools Wind Project tree Devices Insert Online Options Tools Wind Project tree Project configuration Project configuration Project configuration Project configurat	20 PN \$7-1500062-101 Frequeny Converter G120 PN \$7-1500 w Help Control panel Control p	Totally Integrated Automation PORTAL
	Active fault: - Output frequency smoothed Coutput frequency smoothed Coutput voltage smoothed	0.0 Hz 0.0 Vms
Details view Details	Properties Unification	o 1 Diagnostics = -

→ 最后还需要" 🖉 Go offline"并再次保存项目" 🖡 Save project "。(→ 🖉 Go offline → 🖡 Save project)

Ma Siemens - D:\00_TIA_Portal\062-101 FrequencyConverter G120	PN \$7-1500/062-101 Frequeny Converter G120 PN \$7-1500	_ U X
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7.5 创建用于控制变频器的程序

- → 在调整控制变频器的程序之前,首先需要创建两个与发送和接收报文1结构相对应的 "PLC 数据类型" (PLC data types)。
 - (→ PLC 数据类型 (PLC data types) → 添加新数据类型 (Add new data type))



→ 将 PLC 数据类型的名称更改为 "FU_Receive_Telegramm1",并双击打开。 (→ FU_Receive_Telegramm1)

M Siemens - D:\00_TIA_Portal\062-101 FrequencyConverter G12	20 PN \$7-15001062-101 Frequeny Converter G120 PN \$7-1500	_ ¤ ×
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Local modules		
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Portal view Overview		Connection to Drive_G120_conveyor te

→ 与一个数据块类似,创建如下所示的变量。(→ FU_Receive_Telegramm1)

06	2-10	1 Frequency Converter	r G120 PN S	7-1500 🕨 Ci	PU1516F [CF	PU 1516F-3	PN/DP] •	PLC data types FU_RECEIVE_Telegram1	∎≡×
#	*	• • • • • • • •	es 📰 Ik	00					
	FU	RECEIVE Telegram1							
	N	lame	Data type	Default value	Accessible f	Visible in	Setpoint	Comment	
1		Speed OK	Bool	false				Setpoint / actual speed deviation within the tolerance range (1)	
2		Control_requested	Bool	false				The automation system is requested to accept the inverter control(1)	
3	-	Max_speed_reached	Bool	false				Speed is greater than or equal to the maximum speed (1)	
4	-	Warn_torque_limit	Bool	false				Comparison value for current torque has been reached or exceeded (1)	
5	-	Holding_brake	Bool	false				Holding brake open(1)	
6	-00	Motor_temperature	Bool	false				Alarm motor overtemperature(0)	
7		Direction	Bool	false				Motor rotates clockwise(1) / counterclockwise(0)	
8	-	PM_overload	Bool	false				Alarm inverter PM thermal overload (0)	
9	-	Ready_to_Start	Bool	false				Power supply switched on; electronics initialized; pulses locked(1)	
10	-00	Ready	Bool	false				Motor is switched on (ON/OFF1 = 1), no fault is active(1)	
11		Operation_EN	Bool	false				Operation enabled Motor follows setpoint(1)	
12		Fault	Bool	false				Fault active(1)	
13	-	No_OFF2	Bool	false				Coast down to standstill is not active(1)	
14		No_OFF3	Bool	false				Quick stop is not active(1)	
15	-00	Lockout	Bool	false				Closing lockout active(1)	
16		Alarm	Bool	false				Alarm active(1)	
17	-	XIST_A	Int	0				Actual speed value process data (PZD) word2	
	5								>

→ 随后以 "FU_Send_Telegramm1"的名称和如下所示的变量创建另一个 PLC 数据类型。 (→ FU_Send_Telegramm1)

Project tree
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E FU_SEND_Telegram1
-101 Frequency Converter G120 PN S7-1500 CPU1516F [CPU 1516F-3 PN/DP] PLC data types FU_SEND_Telegram1
Name Data type Default value Accessible Visible in Setpoint Comment
reserved 8 Bool false
🖬 reserved 9 Bool false 🗹 🔽 📄 not in use
Control via PLC Bool TRUE 🗹 🔽 Control via fieldbus inverter accepts the process data from fieldbus(1)
Rev_direction Bool false Invert setpoint in the inverter(1)
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Rev_direction Bool false Invert setpoint in the inverter(1) reserved_12 Bool false Invert setpoint in the inverter(1) MOP_up Bool false Invert setpoint saved in the motorized potentiometer(1) MoP_down Bool false Invert setpoint saved in the motorized potentiometer(1) MoP_down Bool false Invert setpoint saved in the motorized potentiometer(1) reserved_15 Bool false Invert setpoint saved in the motorized potentiometer(1) ON_OFF1 Bool false Invert setpoint saved in the motor in use ON_OFF2 Bool TRUE Invert setpoint ON_OFF(0); Switch off the motor inmediately, the motor coasts down to EN_operation Bool TRUE Invert setpoint; Switch OFF (0); Quick stop, the motor bakes with the OFF3 ramp-down tim EN_operation Bool TRUE Invert setpoint; Switch-orn motor (pulses can be enabled) (1) EN_ramp Bool TRUE Invert setpoint; Switch-orn motor (pulses can be enabled) (1) Enable ramp-function (1) / Freeze ramp-function generator (0) Enable ramp-function (1) / Freeze ramp-function generator (0) Enable_setpoint Bool TRUE Invert setpoint; Invert setpoint; Inv

提示:

- 在某些使能位中,起始值已设置为TRUE,因此不必在程序中额外设置这些值。

→ 接下来为任务报文和应答报文创建全局数据块 "FREQUENCY_CONVERTER"。
 (→添加新块 (Add new block) → 数据块 (Data block) → 全局数据块 (Global DB) →
 FREQUENCY_CONVERTER → 确定 (OK))



→ 现在创建变量"Send_G120_01"并选择"FU_SEND_Telegramm1"作为数据类型。 (→Send_G120_01→"FU_SEND_Telegramm1")

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→ 现在创建另一个变量 "Receive_G120_01" 并选择 "FU_RECEIVE_Telegramm1" 作为数据 类型。为这两个变量添加注释。

 $(\rightarrow \text{Receive}_G120_01 \rightarrow \text{``FU}_\text{RECEIVE}_\text{Telegramm1''})$

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→ 通过使用 PLC 数据类型 "FU_SEND_Telegramm1"和 "FU_RECEIVE_Telegramm1"可以 快速且高效地创建数据块,参见图示。

FREQUE	NCY CONVERTER							
Name	-	Data type	Start value	Retain	Accessible f	Visible in	Setpoint	Comment
	tatic							
	Send_G120_01	"FU_SEND_Telegram1"						Send telegram frequency converter G120 conveyor 1
	reserved_8	Bool	false		\$	\checkmark		not in use
	reserved_9	Bool	false		~			not in use
	Control_via_PLC	Bool	TRUE			Image: A start and a start		Control via fieldbus, inverter accepts the process data from fieldbus(1)
	Rev_direction	Bool	false		~	Image: A start and a start		Invert setpoint in the inverter(1)
	reserved_12	Bool	false			Image: A start and a start		not in use
	MOP_up	Bool	false		\checkmark	Image: A start and a start		Increase the setpoint saved in the motorized potentiometer(1)
	MoP_down	Bool	false					Reduce the setpoint saved in the motorized potentiometer(1)
	reserved_15	Bool	false			Image: A start and a start		not in use
	ON_OFF1	Bool	false		 Image: A start of the start of	 Image: A start of the start of		ON(1) / OFF(0) with the ramp-function generator
	ON_OFF2	Bool	TRUE		 Image: A set of the /li>	Image: A start and a start		Switch OFF (0); Switch off the motor immediately, the motor coasts down to st
	ON_OFF3	Bool	TRUE		V	Image: A start and a start		Switch OFF (0); Quick stop, the motor brakes with the OFF3 ramp-down time
	EN_operation	Bool	TRUE		~	V		Enable operation; Switch-on motor (pulses can be enabled) (1)
	EN_ramp	Bool	TRUE		~	V		Enable ramp-function (1) / Reset ramp-function generator output to 0 (0)
	Continue_freez	Bool	TRUE		V	\checkmark		Enable ramp-function (1) / Freeze ramp-function generator (0)
	Enable_setpoint	Bool	TRUE		V	Image: A start and a start		Enable setpoint(1) / Inhibit setpoint(0)
	Acknowledge	Bool	false		V	\checkmark		Acknowledge faults (1)
	NSOLL_A	Int	0		V	\checkmark		Setpointl speed process data (PZD) word2
	Receive_G120_01	"FU_RECEIVE_Telegram1						Receive telegram frequency converter G120 conveyor 1
	Speed_OK	Bool	false		V	\checkmark		Setpoint / actual speed deviation within the tolerance range (1)
	Control_reques	Bool	false		V	\checkmark		The automation system is requested to accept the inverter control(1)
	Max_speed_rea.	Bool	false					Speed is greater than or equal to the maximum speed (1)
	Warn_torque_li	Bool	false			V		Comparison value for current torque has been reached or exceeded (1)
	Holding_brake	Bool	false					Holding brake open(1)
	Motor_tempera	Bool	false					Alarm motor overtemperature(0)
	Direction	Bool	false			V		Motor rotates clockwise(1) / counterclockwise(0)
	PM_overload	Bool	false		V	V		Alarm inverter PM thermal overload (0)
	Ready_to_Start	Bool	false		V	V		Power supply switched on; electronics initialized; pulses locked(1)
	Ready	Bool	false		V	V		Motor is switched on (ON/OFF1 = 1), no fault is active(1)
	Operation_EN	Bool	false		V	V		Operation enabled Motor follows setpoint(1)
	Fault	Bool	false		¥	V		Fault active(1)
	No_OFF2	Bool	false		 Image: A start of the start of			Coast down to standstill is not active(1)
	No_OFF3	Bool	false		 Image: A start of the start of			Quick stop is not active(1)
-	Lockout	Bool	false		 Image: A start of the start of			Closing lockout active(1)
- -	Alarm	Bool	false		 Image: A start of the start of			Alarm active(1)
7 - 301 =	XIST A	Int	0					Actual speed value process data (P7D) word2

→ 此时,可在新变量表中创建全局 PLC 变量,用于与变频器进行通信。
 (→添加新变量表 (Add new tag table))



→ 将变量表名称更改为"Tag_table_G120",如图所示,使用 PLC 数据类型 "FU_RECEIVE_Telegramm1"和 "FU_SEND_Telegramm1"创建两个结 构变量"PZD_IN_G120_01"和 "PZD_OUT_G120_01"。 (→ PZD_IN_G120_01→ "FU_RECEIVE_Telegramm1"→ PZD_OUT_G120_01→ "FU_SEND_Telegramm1")

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	Tag table C120			- Sks
T 0.62-101 Erequency Converter G120 5	Name	Data tuno Addross	Potsin Viribl Accor Commo	
Add new device	1 67 N 87D IN 6120 01	"ELL RECEIVE Tologram1" #1256.0		
Bevices & networks		FU SEND Telegram		5
CPU1516E [CPU1516E-2 PN/DP]	2 var P20_001_0120_01	"FUL DECED/E Telegrant"		l
Device configuration	S CAUGHEWS	"FU_SEND_Tologram1"		Ties
Online & diagnostics	4	Aom Ident		
Program blocks		Rool		
Technology objects		Byte		
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PLC tags		Conn Any		
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Default tag table [61]				
Tag table G120 [2]				
Tag table_sorting station [30				
PLC data types				
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Portal view	Tag table_G			The project 062-101 Frequency Conver

→ 使用 PLC 数据类型 "FU_SEND_Telegramm1"和 "FU_RECEIVE_Telegramm1"创建与其 结构相对应的变量。现在打开块 "Main [OB1]"块。(→ Main [OB1])

Ma Siemens - D:\00_TIA_Portal\062-101 Frequen	icy Conv	verter G12	0 PN S7-1500\062-101 F	requency Converter G120 PN	\$7-1500						_ 0 X
Project Edit View Insert Online Options Tools Window Help Totally Integrated Automation											
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Project tree 🛛 🖣 062-101 Frequency Converter G120 PN \$7-1500 🔸 CPU1516F [CPU 1516F-3 PN/DP] 🕨 PLC tags 🕨 Tag table_G120 [2] 🔷 🗕 🖬 🗮 🗸											
Devices	Devices 🗉 Tags 🖲 User constants 😨										
5	T	ag table	6120								- ks
▼ 1 062-101 Frequency Converter G120 F		Name	0.20	Data type	Address	R	etain	Visibl	Acces	Comment	
Add new device	1	🕣 🔻 P7	D IN G120 01	"EU RECEIVE Telegram1"	%1256.0						, U
Devices & networks	2	-00	Speed OK	Bool	%1256.0					Setpoint / actual speed deviation within the tolerance ra	티문
CPU1516F [CPU 1516F-3 PN/DP]	3	-00	Control requested	Bool	%1256.1					The automation system is requested to accept the inve	2
Device configuration	4	-00	Max speed reached	Bool	%1256.2					Speed is greater than or equal to the maximum speed (S
Conline & diagnostics	5	-00	Warn_torque_limit	Bool	%1256.3				 Image: A start of the start of	Comparison value for current torque has been reached	-
🔻 🔙 Program blocks	6	-00	Holding_brake	Bool	%1256.4				V	Holding brake open(1)	-
📫 Add new block	7	-00	Motor_temperature	Bool	%1256.5			V	V	Alarm motor overtemperature(0)	
Hain [OB1]	8	-00	Direction	Bool	%1256.6				V	Motor rotates clockwise(1) / counterclockwise(0)	
MOTOR_SPEEDCONTROL [F.	9	-00	PM_overload	Bool	%1256.7				V	Alarm inverter PM thermal overload (0)	
MOTOR_SPEEDMONITORIN.	10	-00	Ready_to_Start	Bool	%1257.0			V	V	Power supply switched on; electronics initialized; pulses	
MOTOR_AUTO [FB1]	11	-00	Ready	Bool	%1257.1				V	Motor is switched on (ON/OFF1 = 1), no fault is active(1	
FREQUENCY_CONVERTER [C	12	-00	Operation_EN	Bool	%1257.2				V	Operation enabled Motor follows setpoint(1)	
MAGAZINE_PLASTIC [DB3]	13	-0	Fault	Bool	%1257.3				V	Fault active(1)	
MOTOR_AUTO_DB [DB1]	14	-63	No_OFF2	Bool	%1257.4			V	V	Coast down to standstill is not active(1)	
SPEED_MOTOR [DB2]	15	-00	No_OFF3	Bool	%1257.5			V	 Image: A start of the start of	Quick stop is not active(1)	
Technology objects	16	-00	Lockout	Bool	%1257.6			V	V	Closing lockout active(1)	
External source files	17	-00	Alarm	Bool	%1257.7			V	V	Alarm active(1)	
🔻 🚂 PLC tags	18	-00	XIST_A	Int	%IW258			V	V	Actual speed value process data (PZD) word2	
la Show all tags	19	🛥 💌 PZ	D_OUT_G120_01	"FU_SEND_Telegram1"	%Q256.0	-					
💕 Add new tag table	20	-00	reserved_8	Bool	%Q256.0			V	V	not in use	
Sefault tag table [61]	21	-00	reserved_9	Bool	%Q256.1				V	not in use	
🔩 Tag table_G120 [2]	22	-83	Control_via_PLC	Bool	%Q256.2			V	V	Control via fieldbus, inverter accepts the process data f	
🖫 Tao table_sorting station [30	1 22	<	Day direction	Dool	0,0056.0	ш				Invest consist in the investor(1)	~
> Details view									Q Pr	operties 🐴 Info 😮 💀 Diagnostics 👘 🗖 🚍	
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→ 在 Main [OB1] 开头添加两个新网络。接着通过拖放操作将"指令"(Instructions) 中的"移动 操作"(Move operations) 项下的"移动"(Move) 指令拖到这两个网络中。

(→ \overrightarrow{M} → \overrightarrow{M} → 指令 (Instructions) → 移动操作 (Move operations) → 移动 (Move) → 移动 (Move))



→ 在项目导航中选中"Tag_table_G120"。现在可以通过拖放操作将两个变量 "PZD_IN_G120_01"和"PZD_OUT_G120_01"从细节视图 (Details view) 中直接拖放到移动 (Move) 指令的连接上。(→ Tag_table_G120 → PZD_IN_G120_01 → PZD_OUT_G120_01)



→ 在项目导航中选中数据块 "FREQUENCY_CONVERTER [DB4]"。可以通过拖放操作再次将 两个结构变量 "Send_G120_01"和 "Receive_G120_01"从细节视图 (Details view) 中直接 拖放到移动 (Move) 指令的连接上。(→ Send_IN_G120_01 → Receive_OUT_G120_01)



→ 之后在细节视图 (Details view) 中打开变量 "Receive_G120_01"的结构,并从那里通过拖放 操作将变量 "Receive_G120_01.XIST_A"拖放到 "MOTOR_SPEED_MONITORING" 块的连 接 "Actual_speed_AI" 上。(→ Receive_G120_01.XIST_A)



→ 将变量 "Send_G120_01.NSOLL_A"拖放到 "MOTOR_SPEEDCONTROL" 块的连接 "Setpoint_speed"上。(→ Send_G120_01.NSOLL_A)

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Devices	Options
	Mint 🗔 🛄 🚊
Block interface	> Favorites
The Program blocks	M Paris instructions
E Add new block a >=1 [27] → -ol → -[=]	Name Descript
🐱 Main [081] 🖉 🖉 Block title: "Main Program Susan (Circle)"	Name Descript
MOTOR_SPEEDCONTROL [FC10] Concrete	Bit logic operations
MOTOR_SPEEDMONITORING [FC11]	Timer operations
MOTOR_AUTO [FB1] Network 1: Receive process data from frequency converter G120 conveyor1 (telegram1)	Counter operations
FREQUENCY_CONVERTER [D84] Notwork 2: Send process data to frequency converter (320 conveyor) (relegizam1)	Comparator operation
	Math functions
Details view Network 3: Speed monitoring conveyor motor	Move operations
Network 4: Speed control analog oputput conveyor motor	E MOVE Move va., 8
Name Offset Data type Acc Comment	🗉 Deserialize Deseriali 🗟
Image: Control of the second seco	Serialize Serialize
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Rev_direction Bool True #Motor_speed_	FILL_BLK Fill block
C reserved_12 Bool True monitoring_Ret_	UFILL_BLK Fill bloc
MOP_up Bool True Ret_Val Val	E SWAP Swap
MoP_down Bool True	🕨 🛅 Array DB
reserved_15 Bool True	🕨 🛅 Variant
ON_OFF1 Bool True Manipulated Convertex	Legacy
ON_OFF2 Bool True "SPEED_ Variable_ DEIN_SOLL A	Conversion operation:
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EN_operation Bool True Setpoint_Speed ENO	Word logic operations
Carling Soul True	🕨 🚍 Shift and rotate 🔍 🗸
Continue_ineze_ida Dool True	< III >
Criading_Setuporiti Dour True Network 5: Control conveyor motor forwards in automatic mode	Extended instructions
Atknowledge bool Tube Comment	> Technology
	> Communication
	Optional packages
4 Portal view Transble G. S Main	project 062-101 Frequency Conver

→ 作为开机指令,将变量 "Send_G120_01.ON_OFF1"拖放到 "MOTOR_AUTO" 块的连接 "Conveyor_motor_automatic_mode"上。(→ Send_G120_01.ON_OFF1)



7.6 将程序加载到 SIMATIC S7 CPU 1516F-3 PN/DP

→ 将更改过的和新创建的"程序块"(Program blocks) 加载到 CPU 1516F "
 ② 之前,再次保存项目。
 ○ → [□] Save project</sup> → 程序块 (Program blocks) → [□]

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Project tree	Program blocks > Main [OB1] 💶 🖬 🖬 🗙 Instructions 📰 💷 🕨
Devices	Options
Block Internace	> Favorites
	✓ Basic instructions
Device & networks	Name
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Comment	Bit logic operations
Online & diagnostics Vetwork 1: Receive process data from frequency converter G120 convey	or1 (telegram1)
Ormite a unignostication and a second s	telegrounty telegrounty telegrounty telegrounty telegrounty
Add new block	Comparator operatio.
Main [OB1]	Math functions
MOVE MOVE	Move operations
MOTOR SPEEDMONITORING IFC11 "ERECUENCY	
MOTOR AUTO [FB1] EN CONVERTER".	Desenalize
FREQUENCY CONVERTER [DB4] Receive_G120_	El señalize
MAGAZINE PLASTIC [DB3] "PMZD III 01	
MOTOR_AUTO_DB [DB1] G120_01	
SPEED_MOTOR [DB2]	
Technology objects	
External source files	
PLC tags Vetwork 2: Send process data to requery converter G120 conveyor (elegram ()
Show all tags	Variant
Add new tag table	
Second Se	Conversion operation
🖳 Tag table_G120 [2] EN	Program control one
Tag table_sorting station [30]	Mord Logic operations
Ce PLC data types CONTROL PLC data types	< III >
Add new data type Send G120 OUT	Extended instructions
FU_RECEIVE_Telegram1	> Technology
I FU SEND Telegram1	> 100%
> Details view	es Linfo 3 Diagnostics - A Optional packages
🗸 Portal view 🗄 Overview 🔩 Tag table_G 🐲 Main	✓ The project 062-101 Frequency Conver

7.7 诊断 SIMATIC S7 CPU 1516F-3 PN/DP

→ 为了在程序中诊断变频器的控制情况,可以对 Main [OB1] 块进行观测。单击图标 🎬 启动 或关闭观测。 (→ Main [OB1] → 🎬)



→ 与变频器进行通信的完整的发送和接收数据(控制字/状态字/额定值/实际值),请查看数据块 "FREQUENCY CONVERTER IDB41"。也可以在此位置单击图标 ¹¹ 启动或关闭监测。

	0	
$(\rightarrow FREQUENCY_CONVERTER [DB4])$	\rightarrow))

oject tree		J15							- 🗉 🖬 🗙	Tasks 🗖 🛛
Devices										Options
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062-101 Frequency Converter G120 PN S	: 🔽 🗸		Name	-	Data type	Monitor all Ilue	Monitor value	Retain	Ac	
Add new device		1 🐽	▼ St	atic					~	Find:
h Devices & networks		2 🕣	• •	Send_G120_01	"FU_SEND_Te	eleg				
CPU1516F [CPU 1516F-3 PN/DP]	_	3 🕣		reserved_8	Bool	false	FALSE		(Whole words only
Device configuration		4 📲		reserved_9	Bool	false	FALSE		(
Online & diagnostics		5 🕣		Control_via_PLC	Bool	TRUE	TRUE		(Match case
🔻 🛃 Program blocks		6 🕣		Rev_direction	Bool	false	FALSE		(_	Find in substructures
📫 Add new block		7 🕣		reserved_12	Bool	false	FALSE		(=	Find in hidden texts
📲 Main [OB1]		8 📶		MOP_up	Bool	false	FALSE		(Lico wildcards
MOTOR_SPEEDCONTROL [FC10		9 🕣		MoP_down	Bool	false	FALSE		(
MOTOR_SPEEDMONITORING [F		10 📶		reserved_15	Bool	false	FALSE		(Use regular expressions
MOTOR_AUTO [FB1]		11 📲		ON_OFF1	Bool	false	FALSE			O Whole document
FREQUENCY_CONVERTER [DB4]		12 📲		ON_OFF2	Bool	TRUE	TRUE			
MAGAZINE_PLASTIC [DB3]		13 🕣		ON_OFF3	Bool	TRUE	TRUE		(From current position
MOTOR_AUTO_DB [DB1]		14 📲		EN_operation	Bool	TRUE	TRUE		(Selection
SPEED_MOTOR [DB2]		15 📲		EN_ramp	Bool	TRUE	TRUE		(Down
Technology objects		16 🕣		Continue_freeze_r.	. Bool	TRUE	TRUE		(O
External source files		17 📲		Enable_setpoint	Bool	TRUE	TRUE			⊖ Up
PLC tags		18 📶		Acknowledge	Bool	false	FALSE		[Find
PLC data types		19 🕣		NSOLL_A	Int	0	7741		(
Watch and force tables		20 📲	• •	Receive_G120_01	"FU_RECEIVE	_Telegi			- (Replace with:
Online backups		21 🕣		Speed_OK	Bool	false	TRUE		(
🕨 🔄 Traces		22 📲		Control_requested	Bool	false	TRUE		(Replace Replace all
Program info		23 📲		Max_speed_reache	Bool	false	FALSE		(
🕨 🛄 Device proxy data		24 🕣		Warn_torque_limit	Bool	false	TRUE		(
PLC alarms		25 📲		Holding_brake	Bool	false	FALSE		(
		26 0		Motor tomporature	Pool	falso	TRUE		(Free	

→ 在线网络视图可用于诊断控制器 CPU 1516F 和变频器之间的 PROFINET 连接。
 (→设备与网络 (Devices & networks) → 网络视图 (Network view) → ^Ø Go online)

Contraction State	erter G120 PN S7-1500062-101 Frequency Converter G120 PN S7-1500 _ D
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Devices	🗗 Topology view 🛔 Network view 📑 Device view
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Device proxy data PLC alarms	Show all messages
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> Details view	۲ () () () () () () () () () (
Portal view 🔀 Overview 🍰 Device	es & ne 🗸 Connected to Drive_G120_conveyor, a

7.8 利用 SINAMICS Startdrive 对变频器 G120 进行诊断

 → 在变频器中同样可以对"控制/状态字"(Control/status word)进行监测。控制/状态字 (Control/status word)在"在线&诊断"(Online & diagnostics)中查找。

(→ Drive_G120_Conveyor → 在线与诊断 (Online & diagnostics) → 诊断 (diagnostics) → 控 制/状态字 (Control/status word) → ^{Ø Go online})

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Devices		1		¥
	DDS: 0 (Active - CDS: 0 (Active -			
- 1 062 101 Emanancy Converter 6120 Ph	Online access Control/sta	atus word		^^ [•]
E Add new device	Diagnostics Diagnostics general			
🖉 🎄 Devices & networks	Active messages The signals	actually evaluated or used by the controller are displayed here		Libr
CPU1516F [CPU 1516F-3 PN/DP] ✓ Drive C130 conveyor [C130 CIV	Message history Where the s	signals come from, can be seen in the individual parameter screen form	5.	arie
Device configuration	Control/status word The commu	inication screen forms show the communication interconnections.		
2 Parameter	Safety diagnostics	de texts	Show	/hide texts
Commissioning Planting F	Functions Control wor	rd 1	 Suppler 	nentary control word
Traces B	Backing up/reset			
Common data	o 😛 c	DN/OFF1 [0=No, 1=Yes]	0 🔾	Fixed setp bit 0 [0=No, 1=Yes]
Documentation settings	1 🥥 C	DC / OFF2 [0=No, 1=Yes]	1 🔾	Fixed setp bit 1 [0=No, 1=Yes]
Canguages & resources	2 🥥 🔿	DC / OFF3 [0=No, 1=Yes]	2 🔾	Fixed setp bit 2 [0=No, 1=Yes]
Card Reader/USB memory	з 🥥 с	Dperation enable [0=No, 1=Yes]	з 🔾	Fixed setp bit 3 [0=No, 1=Yes]
	• 4 🥥 F	Ramp-function generator enable [0=No, 1=Yes]	4 🔘	DDS select. bit 0 [0=No, 1=Yes]
	5 🥥 C	Continue ramp-function generator [0=No, 1=Yes]	5 💭	DDS select. bit 1 [0=No, 1=Yes]
	6 🤐 S	Speed setpoint enable [0=No, 1=Yes]	8 🔾	Technology controller enable [0=No, 1=)
	7 🔾 A	Acknowledge fault [0=No, 1=Yes]	9 🔘	DC braking enable [0=No, 1=Yes]
	8 🔾 J	log bit 0 [0=No, 1=Yes]	11 🔘	Droop enable [0=No, 1=Yes]
	ر 🔾 و	log bit 1 [0=No, 1=Yes]	12 🔘	Torque control active [0=No, 1=Yes]
	10 🥥 M	Master ctrl by PLC [0=No, 1=Yes]	13 🥥	External fault 1 (F07860) [0=Yes, 1=No]
	11 🔾 🛛	Direction reversal (setpoint) [D=No, 1=Yes]	15 🔘	CDS bit 1 [0=No, 1=Yes]
	13 🔾 M	Motorized potentiometer raise [0=No, 1=Yes]		
	14 O M	Motorized potentiometer lower [0=No, 1=Yes]		
	15 🔾 🔿	CDS bit 0 [0=No, 1=Yes]		<u> </u>
< II >	<	III		>
> Details view			S Properties	Info 🗓 🖞 Diagnostics 📄 🗖 🗖 🦳
Portal view Online Online	ne & dia		🗸 c	onnected to CPU1516F, address IP=1

→ 在 " 驱 动 器 使 能 " (Drive enable signals) 下 査 看 启 动 电 机 缺 少 的 使 能 。 (→ 驱动器使能 (Drive enable signals))



→ 在"激活的消息"(Active messages)下查看待处理的故障和警告。单击图标" I 可应答这些消息。(→ 激活的消息 (Active messages) → I I

Ma Siemens - D:\00_TIA_Portal\062-101 Frequency Conv	verter G120 PN S7-1500\062-101	Freque	ncy Converter G120	PN S7-1500		_ ¤ ×
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Project tree 🔲 🖣	Converter G120 PN S7-150	00 ► DI	rive_G120_convey	or [G120 CU250S	-2 PN Vector] + Online & diagnostics	_ # = × <
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✓ ① 062-101 Frequency Converter G120 PN 57-1 ✓ ① 062-101 Frequency Converter G120 PN 57-1 ✓ ① Add new device ▲ Devices & networks ↓ @ CPU1516F [CPU 1516F3 PWDP]	Online access Diagnostics Diagnostics general Active messages Message history	Activ	re messages			<
	Controllstatus word Drive enable signals Safety diagnostics Functions Backing up/reset	1 2 3 4 5 6 7 8	Fault buffer Fault 1 Fault 2 Fault 3	Fault code 8501 8501 8501	Message PROFINET: Setpoint timeout PROFINET: Setpoint timeout PROFINET: Setpoint timeout	
<pre></pre>		Ala 1	rms Alarm buffer	Alarm code	Message	
🖣 Portal view 🔛 Overview 😨 Onlin	e & dia				Connection to CPU1516F termina	ted.

→ 也可以在"参数"(Parameter)的"功能视图"(Functional View)中对值进行在线监测。
 (→参数 (Parameter) → 功能视图 (Functional View))

Ma Siemens - D:\00_TIA_Portal\062-101 Frequency Conver	erter G120 PN \$7-1500/062-101 Frequency Converter G120 PN \$7-1500	_ = ×
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Project tree 🛛 🗸 062-	2-101 Frequency Converter G120 PN S7-1500 > Drive_G120_conveyor [G120 CU250S-2 PN Vector] > Parameter	_ # # X 📢
Devices	Wizards	Functional View Parameter View
🖽 🖸 🖸 🔛 🛄 📑 🖻	DS: 0 (Active CDS: 0 (Active Start safety commissioning	Tas
	asic settings Data sets Data sets Units Reference varia ID Technology controller as main speed setpoint ID Technology controller as the speed setpo	236.237 rpm 236.237 rpm 210000.000 rpm
> Details view	<u>S</u> Properties	Info Diagnostics = -
Portal view 🖾 Overview 🦨 Parame	neter	✓ Connection to CPU1516F terminated.

7.9 项目归档

→ 最后我们要将整个项目归档。在菜单项 → "项目" (Project) 选择 → "归档" (Archive...)。打 开归档项目的文件夹,并将项目保存为文件格式 "TIA Portal project archive"。

(→ 项目 (Project) → 归档 (Archive...) → TIA Portal project archives → SCE_EN_062-101 Frequency Converter G120 and S7-1500.... → 保存 (Save))

Ma Siemens - D:\00_TIA_Portal\062-101 Freq	uency	Converter G120 PN S7-1500\0	52-10	01 Frequency Converter G120 PN	\$7-1500		_ ¤ ×
Project Edit View Insert Online Optio	ns T) ±	Tools Window Help C ^{al} ± 🗟 🔃 🟠 🖳 🙀 💋	Go or	online 🖉 Go offline 🕌 🖪 🖪	* 🔳 💷	Totally Integrated Aut	tomation PORTAL
. Migrate project Close Ctrl+W		rter G120 PN S7~1500 P	Dm	nve_G120_conveyor[G120 C02	505-2 PN Vec	orj 🕨 Online & diagnostics	
Save Ctrl+S Save as Ctrl+Shift+S		DDS: 0 CDS: Online access	0				asks
Delete project Ctrl+E Archive Retrieve T Card Reader/USB memory I Memory card file	57	Diagnostics Diagnostics general Active messages Message history		essage history ↓ → Faults			Libraries
Upgrade Print Ctrl+P	-	Control/status word Drive enable signals Safety diagnostics		Fault buffer	Fault code	Message	
Print preview D4lo62-101 Frequency Converter G120 D4lo62-101 Frequency Converter G120 D4lo62-101 Frequency converter G120 D4lo62-101 Frequency converter G120 D4lo62-101 Frequenzumrichter G120 D4lo62-101 Frequenzumrichter G120		 Functions Backing up/reset 		3 4 5 6 7 7			
Exit	-			Alarms	Alarm code	Message	~
Oetails view	>		<	IIII	Section 2015	🗓 Info 🌒 🗓 Diagnostics	
Portal view Overview	ę,	Online & dia				✓ Connection to Drive_G120_convey	or te

7.10 检查清单

以下检验清单帮助学员们/学生们独立检查是否已仔细执行了结构化向导指南中的所有工作步骤并 支持其成功地自行完成该模块。

编号	描述	已检查		
1	已创建搭载控制单元 CU250S-PN Vector 的变频器 SINAMICS G120 作为 CPU1516F-3 PN/DP 分布式外围设备。			
2	已将变频器 G120 作为设备的设备配置成功加载到 CPU1516F-3 PN/DP 中。			
3	已为控制单元 CU250S-PN Vector 分配设备名。			
4	已在 SINAMICS Startdrive 中为用于异步电机的 SINAMICS G120 进行参数 化设置。			
5	已成功将 SINAMICS Startdrive 中的参数化设置加载到变频器 SINAMICS G120 中。			
6	已通过控制面板成功测试利用变频器 SINAMICS G120 运行异步电机的情况。			
7	已创建数据块 "FREQUENCY_CONVERTER" [DB4]。			
8	已在 Main [OB1] 中执行程序更改。			
9	编译并加载程序块成功,无报错。			
10	开启设备 (-K0 = 1) 气缸已缩回/反馈已激活 (-B1 = 1) 紧急停机 (-A1 = 1) 未激活 自动运行模式 (-S0 = 1) 未按下自动模式停止按键 (-S2 = 1) 短暂按下自动模式启动按键 (-S1 = 1) "滑道已占用"传感器已激活 (-B4 = 1) 接着通过变频器开启异步电机并保持激活 → 电机开 (Motor ON)			
11	输送带末端传感器激活 (-B7 = 1) → 电机关 (Motor OFF) (2 秒钟后)			
12	短暂按下自动模式停止按键 (-S2 = 0) → 电机关 (Motor OFF)			
13	急停 (-A1 = 0) 激活 → 电机关 (Motor OFF)			
14	手动运行模式 (-S0 = 0) → 电机关 (Motor OFF)			
15	关闭设备 (-K0 = 0) → 电机关 (Motor OFF)			
16	气缸未缩回 (-B1 = 0) → 电机关 (Motor OFF)			
17	项目成功归档。			

8 练习

8.1 任务要求 - 练习

电 机 最 大 转 速 在 参 数 化 设 置 中 被 限 制 为 500.00 1/min 。 请 相 应 调 整 "MOTOR_ SPEEDCONTROL" [FC10] 和 "MOTOR_SPEEDMONITORING" [FC11] 这两个块, 以便能够通过适当的物理值进行计算。

8.2 技术示意图

请在此位置查看任务要求的技术示意图。



图 5: 技术示意图

Automatikbetrieb		Handbetrieb / Manual mode	
Automatic mode		-S3 Tippbetrieb -M1 vorwärts/	
-P5 gestartet/started		— Manual -M1 forwards	
-S1 Start/start		-S4 Tippbetrieb -M1 rückwärts/	
		Manual -M1 backwards	
-S2 Stopp/stop		-P/ ausgefahren/extended	
_		-S6 Zylinder -M4 austahren/ cylinder -M4 extend	
		-P6 eingetanren/retracted	
		cylinder -M4 retract	
	Automatikbetrieb Automatic mode -P5 gestarte/started -S1 Start/start	Automatikbetrieb Automatic mode -P5 gestartet/started -S1 Start/start	

图 6: 操作面板
8.3 分配表

在该任务中需要使用以下信号作为全局操作数。

DI	类型	标识	功能	NC/NO
1 0.0	BOOL	-A1	报告急停 ok	NC
I 0.1	BOOL	-K0	设备 "ON"	NO
10.2	BOOL	-S0	运行选择开关手动 (0)/自动 (1)	手动 = 0 自动 = 1
10.3	BOOL	-S1	自动模式启动按键	NO
10.4	BOOL	-S2	自动模式停止按键	NC
I 0.5	BOOL	-B1	"气缸 -M4 己缩回"传感器	NO
I 1.0	BOOL	-B4	"滑道已占用"传感器	NO
I 1.3	BOOL	-B7	"有部件在输送带末端"传感器	NO
ED256	STRUCT	PZD_IN_G120_01	报文1从输送带1的G120接收过程数据	

DO	类型	标识	功能	
AD256	STRUCT	PZD_OUT_G120_01	报文1将过程数据发送至输送带1的G120	

分配列表图例

L

- DI
 数字量输入
 DO
 数字量输出
- AI 模拟量输入 AO 模拟量输出
 - 输入 O 输出
- NC 常闭触点 (Normally Closed)
- NO 常开触点 (Normally Open)

8.4 规

划

现在请独立完成任务。

8.5 检查清单 - 练习

以下检验清单帮助学员们/学生们独立检查是否已仔细执行了练习中的所有工作步骤并支持其成功 地自行完成该模块。

编号	描述	已检查
1	已在 "MOTOR_SPEEDCONTROL" [FC10] 中执行程序更改。	
2	已在 "MOTOR_ SPEED_MONITORING" [FC11] 中执行程序更改。	
3	编译并加载程序块成功,无报错。	
4	 开启设备 (-K0 = 1) 气缸已缩回/反馈已激活 (-B1 = 1) 紧急停机 (-A1 = 1) 未激活 自动运行模式 (-S0 = 1) 未按下自动模式停止按键 (-S2 = 1) 短暂按下自动模式启动按键 (-S1 = 1) "滑道已占用"传感器已激活 (-B4 = 1) 接着通过变频器开启异步电机并保持激活。 → 电机开 (Motor ON) 转速与 +/- 50 rpm 范围内的转速额定值相符 	
5	输送带末端传感器激活 (-B7 = 1) → 电机关 (Motor OFF) (2 秒钟 后)。	
6	短暂按下自动模式停止按键 (-S2 = 0) → 电机关 (Motor OFF)	
7	急停 (-A1 = 0) 激活 → 电机关 (Motor OFF)	
8	手动运行模式 (-S0 = 0) → 电机关 (Motor OFF)	
9	关闭设备 (-K0 = 0) → 电机关 (Motor OFF)	
10	气缸未缩回 (-B1 = 0) → 电机关 (Motor OFF)	
11	转速 > 最大故障转速限制→ 电机关 (Motor OFF)	
12	转速 < 最小转速故障限制 → 电机关 (Motor OFF)	
13	项目成功归档。	

9 更多相关信息

为帮助您进行入门学习或深化学习,您可以找到更多指导信息作为辅助学习手段,例如:入门指南、视频、辅导材料、APP、手册、编程指南及试用版软件/固件,单击链接:

siemens.com/sce/drives

预览"其它信息"-准备中

其它信息

西门子自动化教育合作项目

siemens.com/sce SCE 培训资料

siemens.de/sce/module

SCE 培训包 siemens.com/sce/tp

SCE 联系伙伴 siemens.com/sce/contact

数字企业 siemens.com/digital-enterprise 工业 4.0

siemens.com/future-of-manufacturing

全集成自动化 (TIA) siemens.com/tia

TIA Portal siemens.com/tia

SIMATIC 控制器 siemens.com/controller

SIMATIC 技术文档 siemens.com/simatic-doku

工业在线支持 support.industry.siemens.com

产品目录和在线订购系统网上商城 mall.industry.siemens.com

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