SIEMENS

SIMATIC

S7-1500 / ET 200MP

数字量输出模块 DQ 8x24VDC/2A HF (6ES7522-1BF00-0AB0)

手册

版本 12/2015

Answers for industry.

SIEMENS

SIMATIC

S7-1500/ET 200MP
DQ 8x24VDC/2A HF 数字量输出模块
(6ES7522-1BF00-0AB0)

设备手册

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警告提示系统

为了您的人身安全以及避免财产损失，必须注意本手册中的提示。人身安全的提示用一个警告三角表示，仅与财产损失有关的提示不带警告三角。警告提示根据危险等级由高到低如下表示。

⚠危险
表示如果不采取相应的小心措施，**将会**导致死亡或者严重的人身伤害。

⚠警告
表示如果不采取相应的小心措施，**可能**导致死亡或者严重的人身伤害。

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表示如果不采取相应的小心措施，可能导致轻微的人身伤害。

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当出现多个危险等级的情况下，每次总是使用最高等级的警告提示。如果在某个警告提示中带有警告可能导致人身伤害的警告三角，则可能在该警告提示中另外还附带有可能导致财产损失的警告。

合格的专业人员

本文件所属的产品/系统只允许由符合各项工作要求的**合格人员**进行操作。其操作必须遵照各自附带的文件说明，特别是其中的安全及警告提示。 由于具备相关培训及经验，合格人员可以察觉本产品/系统的风险，并避免可能的危险。

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请注意下列说明：

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Siemens 产品只允许用于目录和相关技术文件中规定的使用情况。如果要使用其他公司的产品和组件，必须得到 Siemens 推荐和允许。正确的运输、储存、组装、装配、安装、调试、操作和维护是产品安全、正常运行的前提。必须保证允许的环境条件。必须注意相关文件中的提示。

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前言

本文档的用途

本手册是对系统手册《S7-1500/ET 200MP (http://support.automation.siemens.com/WW/view/zh/59191792)》的补充。

在这些系统手册中，介绍了与这些系统相关的各种功能。

本手册和系统/功能手册中介绍的信息将为您进行系统调试提供技术支持。

相对于先前版本的变更

本手册中介绍了相对于先前版本的变更：

- 从固件版本 V2.1.0 起，通道 0 和通道 4 可选用为脉宽调制 (PWM)。
- 如果通道 0 和 4 用作脉宽调制，则其它通道可继续用作数字量输出。

约定

本手册中使用的术语“CPU”既可指代 S7-1500 自动化系统的 CPU，也可指代 ET 200MP 分布式 I/O 系统的接口模块。

请注意下列注意事项：

说明

这些注意事项包含有关本文档中所述产品、产品操作或文档中应特别关注部分的重要信息。

安全信息

西门子为其产品及解决方案提供工业安全功能，以支持工厂、解决方案、机器、设备和/或网络的安全运行。 这些功能是整个工业安全机制的重要组成部分。 有鉴于此，西门子不断对产品和解决方案进行开发和完善。 西门子强烈建议您定期检查产品的更新和升级信息。

要确保西门子产品和解决方案的安全操作，还须采取适当的预防措施（例如：设备单元保护机制），并将每个组件纳入全面且先进的工业安全保护机制中。 此外，还需考虑到可能使用的所有第三方产品。更多有关工业安全的信息，请访问 Internet (http://www.siemens.com/industrialsecurity)。

要及时了解有关产品的更新和升级信息，请订阅相关产品的实事信息。 更多相关信息，请访问 Internet (http://support.automation.siemens.com)。

开源软件

在所述产品的固件中采用了开源软件 (Open Source Software)。 “开源软件”免费提供。 我们根据适用于产品的规定对所述产品及包含在内的开源软件负责。 Siemens 不对开源软件的非预期用途或因修改开源软件引起的任何故障承担任何责任。

出于法律上的原因，我们有责任原文公布许可条件和版权提示。 相关信息请参见附录。

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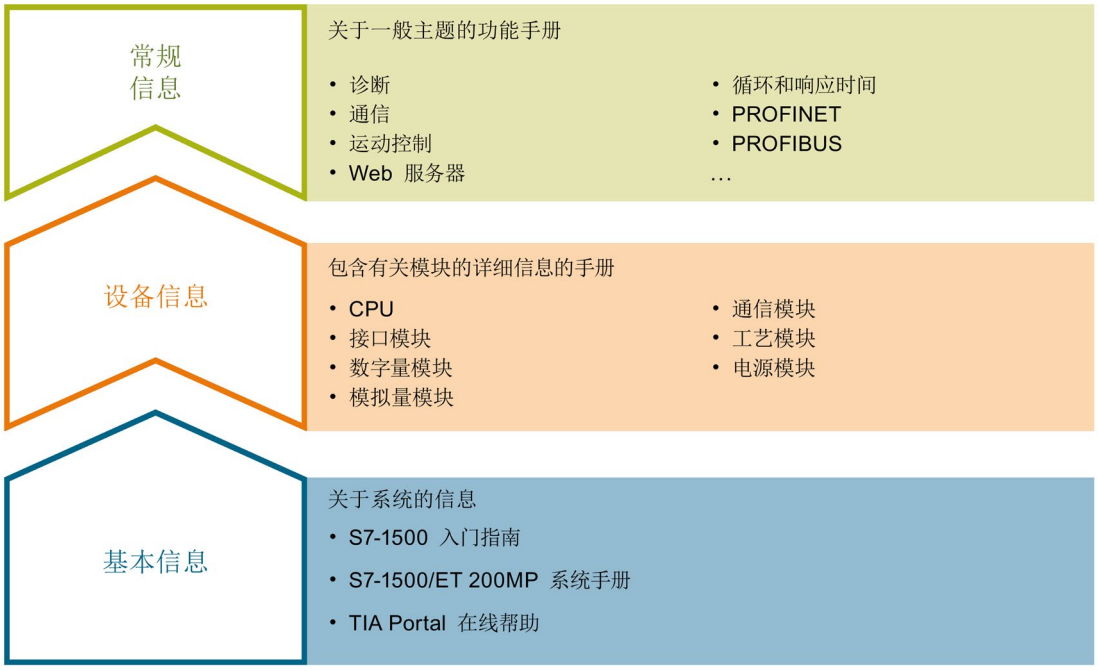
文档指南

1

SIMATIC S7-1500 自动化系统和 SIMATIC ET 200MP 分布式 I/O 系统的文档分为 3 个部分。
这样，用户可以根据具体需求快速访问自己所需内容。



基本信息

系统手册和入门指南中详细介绍了 SIMATIC S7-1500 和 ET 200MP 系统的组态、安装、接线和调试等信息。STEP 7 在线帮助为用户提供了组态和编程方面的支持。

设备信息

产品手册中包含模块特定信息的简要介绍，如特性、接线图、功能特性和技术规范。

常规信息

功能手册中包含有关 SIMATIC S7-1500 和 ET 200MP 系统常规主题的详细介绍，如诊断、通信、运动控制、Web 服务器等等。

相关文档，可从 Internet (http://www.automation.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-controllers/Pages/Default.aspx) 免费下载。

产品信息中记录了对这些手册的更改和补充信息。

相关产品信息，可从 Internet (https://support.industry.siemens.com/cs/cn/zh/view/68052815) 免费下载。

手册集 S7-1500/ET 200MP

该手册集中，将 SIMATIC S7-1500 自动化系统和 ET 200MP 分布式 I/O 系统的所有文档都归纳一个文件中。

该手册集可从 Internet (http://support.automation.siemens.com/WW/view/zh/86140384) 下载。

“我的技术支持”

通过“我的技术支持”（我的个人工作区），“工业在线技术支持”的应用将更为方便快捷。

在“我的技术支持”中，用户可以保存过滤器、收藏夹和标签，请求 CAx 数据以及编译“文档”区内的个人数据库。此外，支持申请页面还支持用户资料自动填写。用户可随时查看当前的所申请的支持请求。

要使用“我的技术支持”中的所有功能，必须先进行注册。

有关“我的技术支持”，敬请访问 Internet (https://support.industry.siemens.com/My/ww/zh)。

“我的技术支持” - 文档

在“我的技术支持”中的“文档”区域，用户可以使用整个手册或部分手册生成自己的手册。也可以将手册导出为 PDF 文件或后期可编辑的其它格式。

有关“我的技术支持” - 文档，敬请访问 Internet (http://support.industry.siemens.com/My/ww/zh/documentation)。

“我的技术支持” - CAx 数据

在“我的技术支持”中的 CAx 数据区域，可以访问 CAx 或 CAe 系统的最新产品数据。

仅需轻击几次，用户即可组态自己的下载包。

在此，用户可选择：

- 产品图片、二维码、3D 模型、内部电路图、EPLAN 宏文件
- 手册、功能特性、操作手册、证书
- 产品主数据

有关“我的技术支持” - CAx 数据，敬请访问 Internet (http://support.industry.siemens.com/my/ww/zh/CAxOnline)。

应用示例

应用示例中包含有各种工具的技术支持和各种自动化任务应用示例。自动化系统中的多个组件完美协作，可组合成各种不同的解决方案，用户无需再关注各个单独的产品。

有关应用示例，敬请访问 Internet (https://support.industry.siemens.com/sc/ww/zh/sc/2054)。

TIA Selection Tool

通过 TIA Selection Tool，用户可选择、组态和订购全集成自动化 (TIA) 中所需设备。
该工具是 SIMATIC Selection Tool 的新一代产品，在一个工具中完美集成了自动化技术的各种已知组态程序。
通过 TIA Selection Tool，用户可以根据产品选择或产品组态生成一个完整的订购列表。

有关 TIA Selection Tool，敬请访问 Internet (http://w3.siemens.com/mcms/topics/en/simatic/tia-selection-tool)。

产品总览

2

2.1 特性

产品编号

6ES7522-1BF00-0AB0

模块视图

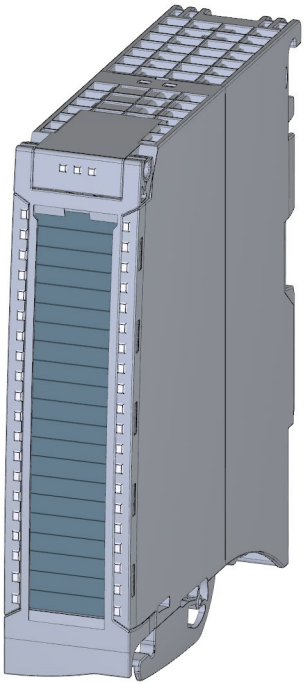


图 2-1 DQ 8x24VDC/2A HF 模块的视图

特性

该模块具有下列技术特性：

- 8 个数字量输出，按每组 4 个进行电气隔离
  - 其中，通道 0 和 4 可选用作脉宽调制 (PWM)。
- 额定输出电压 24 V DC
- 额定输出电流 2 A
- 可分配替换值（每个通道）
- 可组态的诊断（每个通道）
- 适用于电磁阀、直流接触器和指示灯

模块支持以下功能：

表格 2- 1　模块功能与版本的相关性

功能	模块的固件版本	组态软件	
		STEP 7 (TIA Portal)	STEP 7 (TIA Portal) V12 及更高版本或 STEP 7 V5.5 SP3 及更高版本中的 GSD 文件
固件更新	V1.0.0 或更高版本	V12 或更高版本	--- / √
标识数据 I&M0 到 I&M3	V1.0.0 或更高版本	V12 或更高版本	√
RUN 模式下的参数分配	V1.0.0 或更高版本	V12 或更高版本	√
模块内部 Shared Output (MSO)	V2.0.0 或更高版本	V13 Update 3 或更高版本 （仅限 PROFINET IO）	√ （仅限 PROFINET IO）
脉宽调制 (PWM) 通道 0 和 4	V2.1.0 或更高版本	V13 SP1 + HSP 0178 及以上版本 （仅限 PROFINET IO）	√ （仅限 PROFINET IO）

可通过 STEP 7 (TIA Portal) 和 GSD 文件组态模块。

附件

以下附件既可以随模块一起提供，也可以作为备件单独订购：

- 标签条
- U 型连接器
- 通用前盖板

其它组件

以下组件必须单独订购：

前连接器，包括电位跳线和扎带

有关附件的更多信息，请参见系统手册《S7-1500/ET 200MP (http://support.automation.siemens.com/WW/view/zh/59191792)》。

2.2 功能

2.2.1 脉宽调制 (PWM)

该模块的通道 0 和 4 支持脉宽调制功能 (PWM)。通过脉宽调制功能，可为上述通道快速生成额定电压恒定且脉宽可变的周期性脉冲。

优势

- 自动生成周期性脉冲信号（无需用户程序）。
- 可降低功率，如电磁阀中。

典型应用领域：

- 控制比例阀和值（如，通过降低维持电流进行节能）。
- 通过诸如外部电源装置进行加热控制

要求

模块的固件版本为 V2.1.0 及更高版本

规则

在脉宽调制模式中，可同时使用通道 0 和 4，也可单独使用。剩下的通道可继续用作数字量输出。

组态

可以使用以下参数来组态脉宽调制：

- 激活该功能的脉宽调制模式
- 脉宽调制（时间周期）

工作原理

在脉宽调制模式中，两个输出（通道 0 和 4）可生成一个脉宽调制输出信号。

脉宽调制可通过时间周期（频率）和占空比（又称为 ON 周期或 Duty Cycle ）进行设置。其中，占空比列示了脉冲宽度和时间周期的关系。

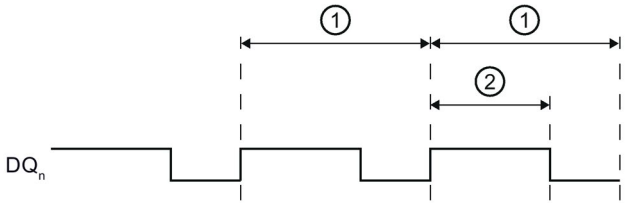
脉冲宽度可由时间周期和占空比计算得出：脉冲宽度 = 占空比 x 时间周期

以下为占空比为 50% 且时间周期为 10ms 时的示例：

脉冲宽度 0.5 x 10 ms = 5 ms、

在用户程序，可通过过程映像输出中的输出值（0 到 1000）定义通道 0 和 4 的占空比，请参见“脉宽调制模式的地址空间 (页 25)”部分。

输出信号是一组方波信号（开/关脉冲的脉冲序列）。



① 时间周期 T（2 到 100 ms）；脉宽调制的频率：f = 1/T（10 到 500 Hz）
② 脉冲宽度（占空比 x 时间周期）

图 2-2 脉宽调制的工作原理

最小脉冲宽度

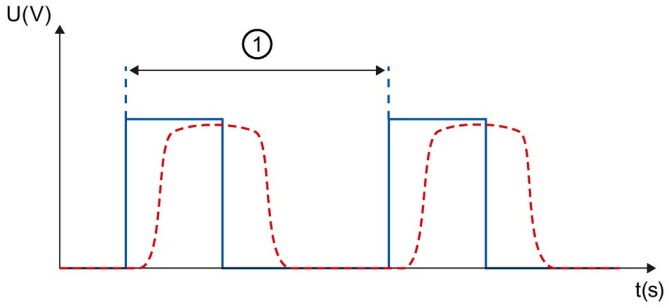
最小的脉冲宽度为 300 µs，具体取决于硬件设备。占空比的调整范围为 0.0 到 100.0%。时间周期的调整范围为 2 到 100 ms。

示例：如果将输出的时间周期组态为 2 ms 并将占空比设置为 0.1%，则相应的脉冲宽度为 200 µs。但在实际应用中，输出的最小脉冲宽度为 300 µs。

脉冲波形

实际信号波形中的脉冲宽度通常远远大于指定的理想脉宽。

下图显示了 PWM 控制输出时的波形图。蓝线表示输出被控制时指定的理想信号（方波信号波形）。红色虚线则表示输出图中因连接外部负载而产生的实际信号波形。



① 时间周期
② 脉冲宽度（占空比 x 时间周期）

图 2-3 输出端子处的脉冲波形

通过降低维持电流实现节能的示例

激活一个电磁阀时，需要一个高启动电流。而电磁阀激活后，对电流值的要求降低，只需保持当前状况即可。这种随时间变化的电流需求量可完美满足 PWM 功能的要求。

下图中，到达组态的时间 (HoldTime) 后，“ValveControl”函数块中的值将立即设置为电磁阀所需的维持电流。所需的维持电流可通过占空比计算得出（PWM 占空比 << 100%）。如果未超出“HoldTime”时间，则将置位输出（占空比 = 100%），为电磁阀生成一个高起动扭矩。

```
FUNCTION_BLOCK "ValveControl"
{ S7_Optimized_Access := 'FALSE' }
VERSION : 0.1
VAR_INPUT
      OutputTrigger : Bool; // Binary control of the output
      HoldTime : Time; // Lenght of time until the PWM output
begins
      PWM_DutyCycle : Int; // PWM duty cycle after hold time
END_VAR
VAR_OUTPUT
      PWM_Out : Int; // Value for PWM output
END_VAR
VAR
      Hold_TON {OriginalPartName := 'TON'; LibVersion := '1.0'} :
TON;
END_VAR

BEGIN

#Hold_TON(IN:=#OutputTrigger,
     PT:=#HoldTime);
IF #OutputTrigger = FALSE THEN
     #PWM_Out := 0;
     RETURN;
END_IF;
  IF #Hold_TON.Q THEN
     // Hold time expired => switch to PWM mode
     #PWM_Out := #PWM_DutyCycle;
ELSE
     // Control output to 100% during hold time
     #PWM_Out := 1000;
END_IF;

END_FUNCTION_BLOCK
```

接线

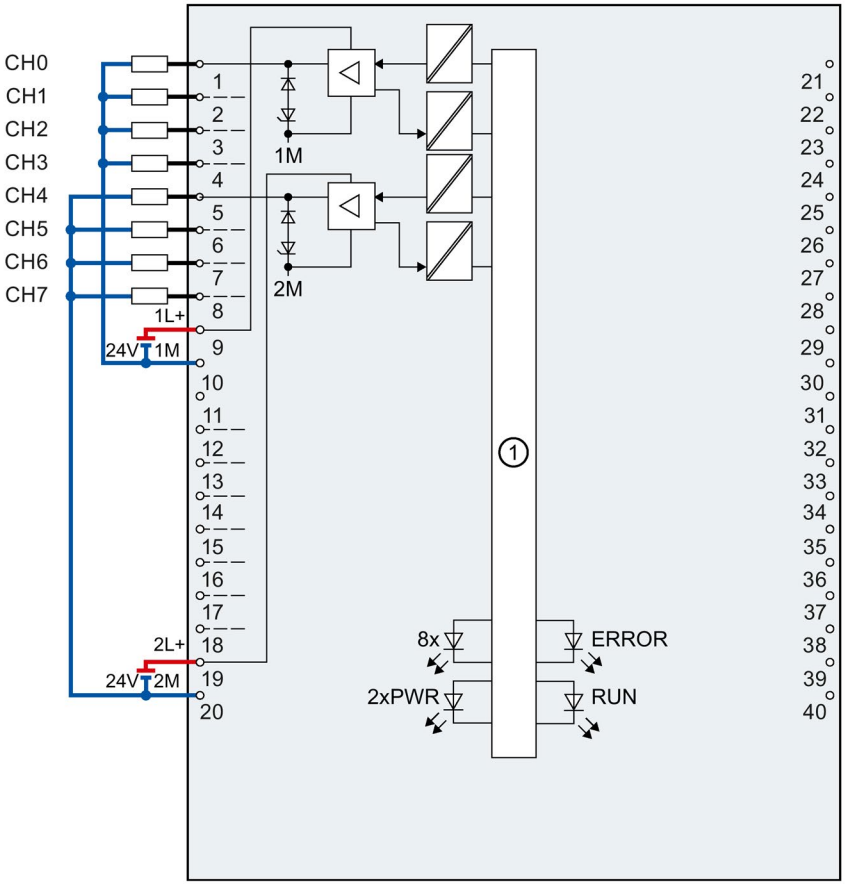
3

下面介绍了模块的方框图以及各种连接方式。

有关前连接器的接线和铺设电缆屏蔽等信息，请参见系统手册《S7-1500/ET 200MP (http://support.automation.siemens.com/WW/view/zh/59191792)》中的“接线”部分。

方框图和端子分配

下图举例说明了通道分配的端子分配。通过为通道 0 和 4 分配参数，可将其设置为脉宽调制模式。



①	背板总线接口	CHx	通道或通道状态 LED 指示灯（绿色/红色）
xL+	电源电压 24 V DC	RUN	状态 LED 指示灯（绿色）
xM	接地	ERROR	错误 LED 指示灯（红色）
		PWR	POWER 电源电压 LED 指示灯（绿色）

图 3-1　　方框图和端子分配

接线感性负载输出的通道 0 和 4

如果将通道 0 和 4 设置为脉宽调制模式，则需要在输出 CH0 和 CH4 处连接一个外部二极管（阻断电压 U_R > 60 V；允通电流 I_F > 1.5 V），如下图所示。

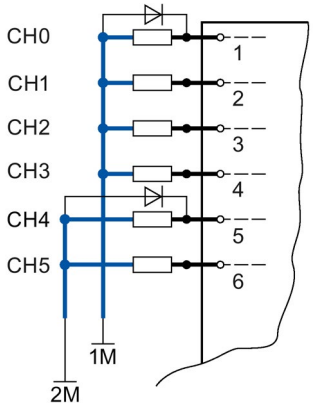


图 3-2　　接线感性负载的输出

参数/地址空间

4

4.1 参数

DQ 8x24VDC/2A HF 参数

在 STEP 7 中指定模块参数时，可使用不同的参数来设置模块属性。下表列出了可组态的参数。可组态参数的有效范围取决于组态的类型。可进行以下组态：

- 使用 S7-1500 CPU 进行统一操作
- 在 ET 200MP 系统中 PROFINET IO 上进行分布式操作
- 在 ET 200MP 系统中的 PROFIBUS DP 上进行分布式操作

在用户程序中进行参数分配时，可通过 WRREC 指令（RUN 模式下的参数分配）和数据记录将这些参数传送到模块中；请参见章节 参数分配和参数数据记录的结构 (页 38)。

4.1.1 DQ 操作模式的参数

DQ 8x24VDC/2A HF 参数

下表列出了 DQ 模式下的参数。这些参数可应用于通道 0 到 7。

表格 4- 1　可组态的参数及其默认值

参数	取值范围	默认设置	RUN 模式下的参数分配	组态软件工具，例如 STEP 7 (TIA Portal)	
				集成在硬件目录 STEP 7 (TIA Portal) V12 及更高版本或 PROFINET IO GSD 文件中	PROFIBUS DP GSD 文件
诊断					
• 电源电压 L+ 缺失	√/-	-	√	通道*	通道组
• 接地短路	√/-	-	√	通道	通道组
对 CPU STOP 模式的响应	• 停止 • 保留上一个值 • 输出替代值 1	停止	√	通道	通道

* 如果启用了多通道诊断，则将在电源突发故障时一次收到多条信息，这是由于每个启用的通道都会检测这一故障。

为避免一次收到多条消息，可以只激活一个通道的电源故障诊断功能。

4.1.2 DQ 模式下的参数说明

电源电压缺失

如果电源电压 L+ 缺失或不足，则启用该诊断报警。

接地短路

如果执行器电源发生接地短路，则启用该诊断。

对 CPU STOP 模式的响应

确定 CPU 转入 STOP 模式或与 CPU 的连接中断时，该输出的响应。

4.1.3 脉宽调制操作模式下的参数

DQ 8x24VDC/2A HF 参数

下表列出了脉宽调制模式下的参数。这些参数适用于通道 0 和 4。

表格 4- 2 可组态的参数及其默认值

参数	取值范围	默认设置	RUN 模式下的参数分配	组态软件工具，例如 STEP 7 (TIA Portal)	
				集成在硬件目录 STEP 7 (TIA Portal) V13 SP1 及更高版本或 PROFINET IO GSD 文件中	PROFIBUS DP GSD 文件
诊断					
• 电源电压 L+ 缺失	√/-	-	√	通道	---
• 接地短路	√/-	-	√	通道	---

参数	取值范围	默认设置	RUN 模式下的参数分配	组态软件工具，例如 STEP 7 (TIA Portal)	
				集成在硬件目录 STEP 7 (TIA Portal) V13 SP1 及更高版本或 PROFINET IO GSD 文件中	PROFIBUS DP GSD 文件
对 CPU STOP 模式的响应	• 关断 • 保留上一个值	关断	√	通道	---
操作模式	• 数字量输出 (DQ) • 脉宽调制	数字量输出 DQ	√	通道	---
脉宽调制（时间周期）	2 到 100 ms*	10 ms	-	模块	---

*20 到 1000 [x 0.1]，使用 GSD 文件

4.1.4 脉宽调制模式下的参数说明

电源电压缺失

如果电源电压 L+ 缺失或不足，则启用该诊断。

接地短路

如果执行器电源接地短路，则启用该诊断。

对 CPU STOP 模式的响应

CPU 转入 STOP 模式或与 CPU 的连接中断时，确定该输出的响应。

操作模式

指定模块中通道 0 和 4 的操作模式。

- 指定数字量输出 DQ 作为数字量输出通道
- 脉宽调制，请参见“脉宽调制 (PWM) (页 12)”部分

脉宽调制时间周期

指定脉冲周期以及脉宽调制的频率。
参见“脉宽调制 (PWM) (页 12)”部分。

4.2 地址空间

在 STEP 7 中，可采用不同方式对模块进行组态；请参见下表。根据组态的不同，将在输出/输入的过程映像中另外指定地址或指定不同地址。

DQ 8x24VDC/2A HF 的组态选项

可通过 STEP 7 (TIA Portal) 或 GSD 文件组态模块。

使用 GSD 文件组态模块时，可使用不同的缩写/模块名来表示组态。

可进行以下组态：

表格 4- 3　组态选项

组态	GSD 文件中的简短标识/模块名	组态软件，如 STEP 7 (TIA Portal)	
		集成在硬件目录 STEP 7 (TIA Portal) 中	STEP 7 (TIA Portal) V12 或更高版本/STEP 7 V5.5 SP3 或更高版本中的 GSD 文件
1 x 8 通道（不带值状态）	DQ 8x24VDC/2A HF	√	√
1 x 8 通道（带值状态）	DQ 8x24VDC/2A HF QI	√	√
1 x 8 通道（带最多 4 个子模块中模块内部 Shared Output 的值状态）	DQ 8x24VDC/2A HF MSO	V13 Update 3 或更高版本（仅限 PROFINET IO）	√（仅限 PROFINET IO）
1 x 8 通道，带值状态（通道 0 和 4 用作 PWM）	DQ 8x24VDC/2A HF PWM	V13 SP1 及以上版本 + HSP0178	√（仅限 PROFINET IO）

说明

共享设备模板在以下组态中的替代值操作：

- **1 x 8 通道，带值状态，用于 MSO**
- **1 x 8 通道，带/不带值状态**

如果系统为设备共享模式，且其中一个 IO 控制器转入 STOP 模式或因通信故障等原因无法正常运行，则输出模块的所有子模块都将执行所组态的替代值响应（如，关机）。

这意味着，即使只有一个 IO 控制器故障，与共享设备相关的其它 IO 控制器也无法再控制该输出模块已分配的子模块。

值状态 (Quality Information, QI)

具有以下名称的模块将始终激活值状态：

- DQ 8x24VDC/2A HF QI
- DQ 8x24VDC/2A HF MSO
- DQ 8x24VDC/2A HF PWM

对于值状态，系统将为每个通道指定一个附加位。值状态位将指示用户程序中所指定的输出值在模块端是否未得到确认（0 = 值不正确）。

4.2.1 操作模式 DQ 的地址空间

组态为 8 通道 DQ 8x24VDC/2A HF 的地址空间

下图显示了组态为带值状态的 8 通道模块的地址空间分配。可任意指定模块的起始地址。通道的地址将从该起始地址开始。

在模块上印有字母“a”；其中，“AB a”是指模块起始地址的输出字节 a。

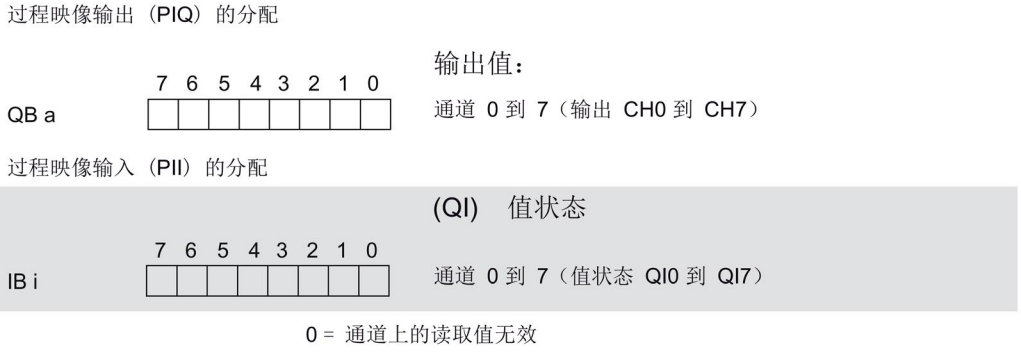


图 4-1 组态为带值状态的 8 通道 DQ 8x24VDC/2A HF 的地址空间

组态为 1 x 8 通道 DQ 8x24VDC/2A HF MSO 的地址空间

组态为 1 x 8 通道模块（模块内部 Shared Output，MSO）时，系统将模块的通道 0 到 7 复制到多个子模块中。之后，在各个子模块中通道 0 到 7 的值都将相同。在共享设备中使用该模块时，可将这些子模块分配给最多 4 个 IO 控制器：

- 分配给子模块 1 的 IO 控制器对输出 0 到 7 具有写访问权限。
- 分配给子模块 2、3 或 4 的 IO 控制器则对输出 0 到 7 具有读访问权限。

IO 控制器的数量取决于所使用的接口模块。请遵循本手册中有关特定接口模块的信息。

值状态 (Quality Information, QI)

值状态的含义取决于所在的子模块。

对于第一个子模块（= 基本子模块），值状态为 0 表示值不正确或基本子模块的 IO 控制器处于 STOP 状态。

对于第二到第四个子模块（MSO 子模块），值状态“0”表示值不正确或发生以下某种错误：

- 基本子模块尚未组态（未就绪）。
- IO 控制器与基本子模块间的连接已中断。
- 基本子模块的 IO 控制器处于 STOP 或 POWER OFF 状态。

下图显示了子模块 1、2、3 和 4 的地址空间分配和值状态。

图 4-2　　组态为带值状态的 1 x 8 通道 DQ 8x24VDC/2A HF MSO 的地址空间

参考资料

有关部共享输入/输出 (MSI/MSO) 功能的信息，请参见《使用 STEP 7 V13 组态 PROFINET (https://support.industry.siemens.com/cs/cn/zh/view/49948856)》手册中的“模块内部共享输入/输出 (MSI/MSO)”部分。

4.2.2 脉宽调制模式的地址空间

组态为 1 x 8 通道 DQ 8x24VDC/2A PWM 的地址空间

如果在“脉宽调制模式”（通道 0 和 4）下使用该模块，则该模块可使用以下地址空间：

- 过程映像输出中的 6 个字节
- 过程映像输入中的 1 个字节

过程映像的分配

如果在参数中将通道 0 和 4 设置为“脉宽调制”模式，则第 0 位和第 4 位无作用。在以下输出字节中输入负载因子（占空比），如下图所示。

$$\text{占空比} = \frac{\text{脉冲宽度}}{\text{时间周期}}$$

过程映像输出 (PIQ) 中的分配

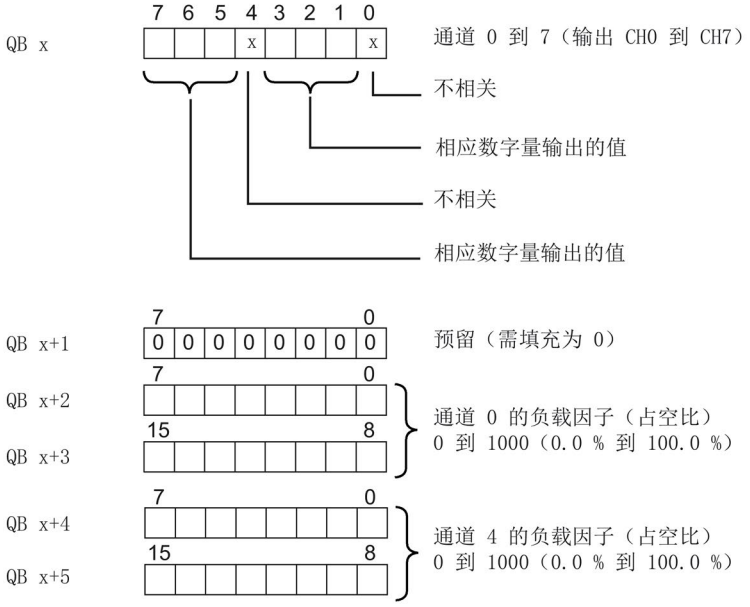


图 4-3 过程映像输出中的分配

下图显示了模块的地址空间分配。

过程映像输入 (PII) 中的分配

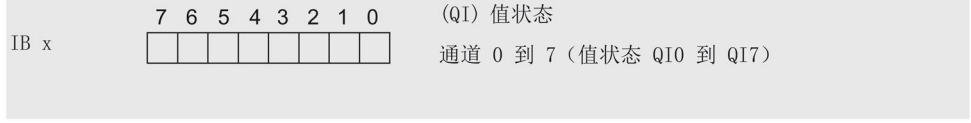


图 4-4 过程映像输入中的分配

中断/诊断报警

5

5.1 状态和错误指示灯

LED 指示灯

下图显示了 DQ 8x24VDC/2A HF 的 LED 指示灯（状态和错误指示灯）。

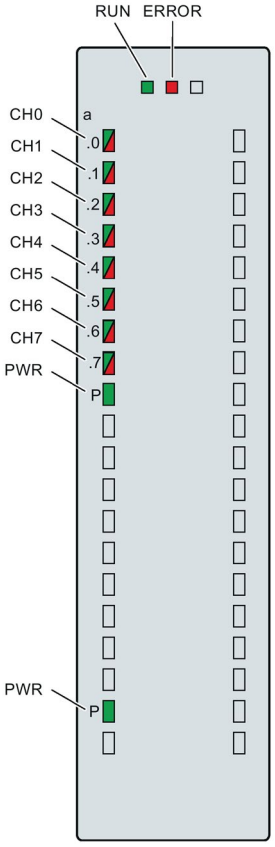


图 5-1 LED 模块的指示灯 DQ 8x24VDC/2A HF

LED 指示灯的含义

下表列出了状态和错误指示灯的含义。 要了解诊断报警的补救措施，请参见“诊断报警 (页 29)”部分。

RUN 和 ERROR 指示灯

表格 5- 1　状态和错误指示灯 RUN 和 ERROR

LED		含义	解决方法
RUN	ERROR		
▫ 灭	▫ 灭	背板总线上电压缺失或过低。	• 接通 CPU 和/或系统电源模块。 • 验证是否插入 U 型连接器。 • 检查是否插入了过多的模块。
☼ 闪烁	▫ 灭	模块启动并在设置有效参数分配之前一直闪烁。	---
■ 亮	▫ 灭	模块已组态。	
■ 亮	☼ 闪烁	表示模块错误（至少一个通道上存在故障，例如，接地短路）。	判断诊断数据并消除该错误（例如，检查电缆）。
☼ 闪烁	☼ 闪烁	硬件缺陷。	更换模块。

PWR LED 指示灯

表格 5- 2　PWR 状态指示灯

LED PWR	含义	解决方法
▫ 灭	电源电压 L+ 过低或缺失。	检查电源电压 L+。
■ 亮	有电源电压 L+ 且电压正常。	---

CHx LED 指示灯

表格 5- 3　CHx 状态指示灯

LED CHx	含义	解决方法
□ 灭	0 = 输出信号的状态。	---
■ 亮	1 = 输出信号的状态。	---
■ 亮	分配的通道参数（通道故障未决；接地短路在相应通道中未决）。	检查接线并纠正接地短路。
	电源电压 L+ 过低或缺失。	检查电源电压 L+。

5.2 中断

数字量输出模块 DQ 8x24VDC/2A HF 支持诊断中断。

有关错误事件的更多信息，请参见指令“RALRM”（读取额外的中断信息）的错误 OB 以及 STEP 7 在线帮助。

诊断中断

在发生以下情况时该模块将生成诊断中断：

- 电源电压 L+ 缺失
- 接地短路
- 参数分配错误

5.3 诊断报警

诊断报警

为模块上的每个诊断事件生成一个诊断报警，同时 ERROR LED 指示灯闪烁。例如，可在 CPU 的诊断缓冲区中读取诊断报警。可通过用户程序评估错误代码。

如果在 ET 200MP 系统中通过 PROFIBUS DP 对模块进行分布式操作，则可使用指令 RDREC 或 RD_REC 通过数据记录 0 和 1 读取诊断数据。有关数据记录结构，请参见 Internet 上的“接口模块 IM 155-5 DP ST (6ES7155-5BA00-0AB0) 手册”。

表格 5- 4　诊断报警、含义以及更正措施

诊断报警	错误代码	含义	更正措施
接地短路*	1_H	通道断路或过载	检查接线/执行器。检查环境温度。
参数分配错误	10_H	• 模块无法评估该通道的参数。 • 参数分配错误	更正参数分配
负载电压缺失	11_H	模块的电源电压 L+ 缺失	将电源电压 L+ 连接到模块/通道上

*在模块调制模式下，脉宽 <500 ms 时输出该诊断消息。系统禁用脉宽 <500µs 的 诊断。

技术规范

6

DQ 8x24VDC/2A HF 的技术规范

	6ES7522-1BF00-0AB0
常规信息	
产品类型标识	DQ 8x24VDC/2A HF
硬件功能状态	FS01
固件版本	V2.1.0
• 可进行固件更新	√
产品功能	
I&M 数据	√；I&M0 到 I&M3
工程组态方式	
TIA Portal 中 STEP 7 可组态的版本/可集成的版本（或更高版本）	V13 SP1 / -
STEP 7 可组态的版本/可集成的版本（或更高版本）	V5.5 SP3 / -
PROFIBUS GSD 文件版本/GSD 文件修订版及更高版本	V1.0 / V5.1
PROFINET GSD 文件版本/GSD 文件修订版及更高版本	V2.3 / -
运行方式	
DQ	√
节能 DQ	√；适用
PWM	√
MSO	√
电源电压	
直流额定电压	24 V
直流电压下限	20.4 V
直流电压上限	28.8 V
反极性保护	√；每组 10 A 的内部保护

	6ES7522-1BF00-0AB0
输入电流	
最大电流损耗	40 mA；每组 20 mA，未激活输出。
输出电压	
直流额定电压	24 V
功率	
背板总线上的功耗	0.9 W
功耗	
典型功耗	5.6W；PWM 模式时为 6.8W
数字量输出	
输出数量	8
切换到 P 电位	√
短路保护	
• 典型响应阀值	3 A
电感关断电压的限值	-17 V
数字量输入的控制	√
数字量输出功能，可组态	
可任意使用数字量输出	√
PWM 输出	√
• 最大数	2
• 时间周期，可组态	√；2 ms 到 100 ms，连续
• 最小负载因子	0%
• 最大负载因子	100%
• 负载因数的精度	0.1%
• 最小脉宽	300 µs
输出的转换能力	
最大灯负载	10 W
负载电阻范围	
下限	12 Ω
上限	4 kΩ

	6ES7522-1BF00-0AB0
输出电压	
信号为“1”时的最小电压	L+ (-0.8 V)
输出电流	
信号为“1”时的额定电流	2 A
信号为“1”时允许的最大电流范围	2.4 A，参见 PWM 模式下的降额技术规范
信号为“0”时残余电流的最大值	0.5 mA
输出延时，有阻性负载	
“0”到“1”，典型值	80 µs
从“0”到“1”时的最长时间	100 µs
“1”到“0”，典型值	300 µs
从“1”到“0”时的最长时间	500 µs
并行连接 2 个输出	
逻辑运算	√
提高性能	-
对于负载的冗余控制	√
切换频率	
最大阻性负载	100 Hz；PWM 模式：500 Hz
最大感性负载	0.5 Hz；符合 IEC 60947-5-1, DC-13 标准；最大 500 Hz，PWM 模式下仅使用外部接线；另请参见手册中的说明信息
最大灯负载	10 Hz
输出的总电流	
每个通道的最大电流	2 A；参见手册中的更多说明
每组的最大电流	8 A；参见手册中的更多说明
每个模块的最大电流	16 A；参见手册中的更多说明
电缆长度	
最大屏蔽电缆长度	1000 m
最大非屏蔽电缆长度	600 m
等时同步模式	
等时同步模式（应用程序最多同步到终端）	-

	6ES7522-1BF00-0AB0
中断/诊断/状态信息	
可应用替换值	√
中断	
诊断中断	√
诊断报警	
诊断	√
电源电压监视	√
短路	√
组错误	√
诊断指示器 LED 指示灯	
RUN LED 指示灯	√；绿色 LED 指示灯
ERROR LED 指示灯	√；红色 LED 指示灯
电源电压监视 (PWR LED)	√；绿色 LED 指示灯
通道状态显示	√；绿色 LED 指示灯
通道诊断	√；红色 LED 指示灯
模块诊断	√；红色 LED 指示灯
电气隔离	
通道的电气隔离	
通道之间	-
通道之间，每组个数	4
通道与背板总线之间	√
绝缘	
绝缘测试	707 V DC（型式试验）
分布式模式	
优先启动	√
尺寸	
宽	35 mm
高	147 mm
深	129 mm
重量	
约重	240 g

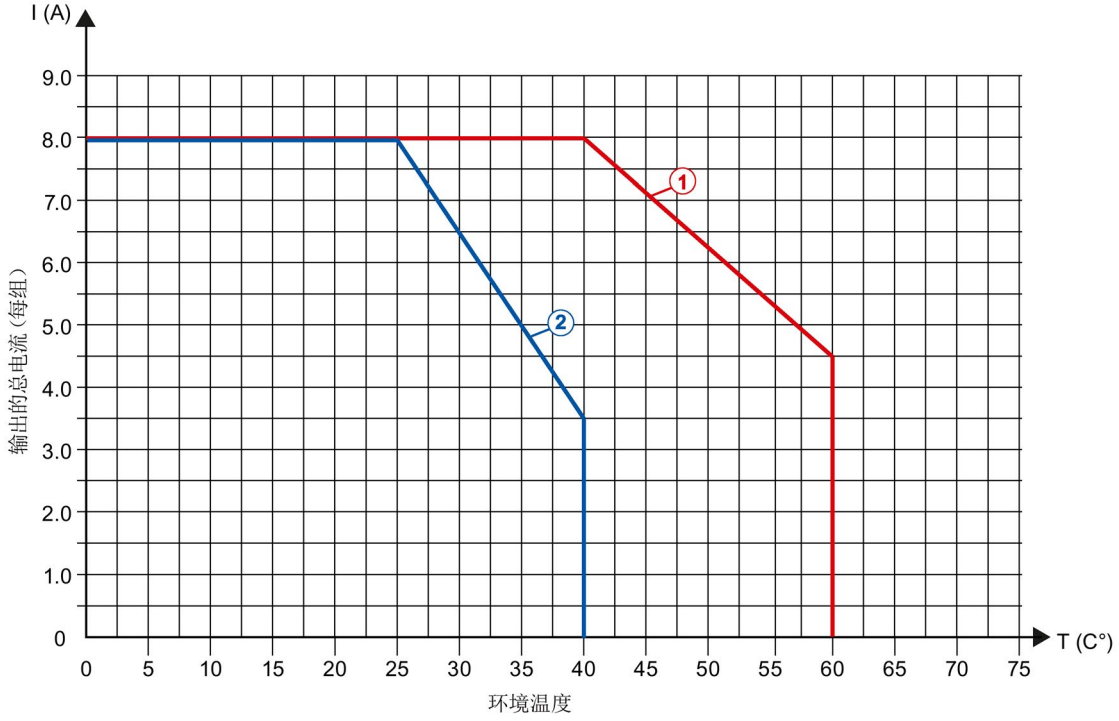
每组输出总电流功耗降低的额定值

在下图中，显示了各种因素对输出值的影响：

- 自动化系统 S7-1500 / 分布式 I/O 系统 ET 200MP 的安装位置
- 操作模式
- 切换频率
- 环境温度

DQ 模式和 PWM 模式下，最大开关频率为 100Hz

下图显示了各通道的最大输出总电流为 2 A 时的阻性负载和感性负载。有关 PWM 模式下额外连接外部二极管时所需的感性负载，请参见“接线 (页 16)”部分。有关各通道或各模块中输出的总电流，请参见技术规范。

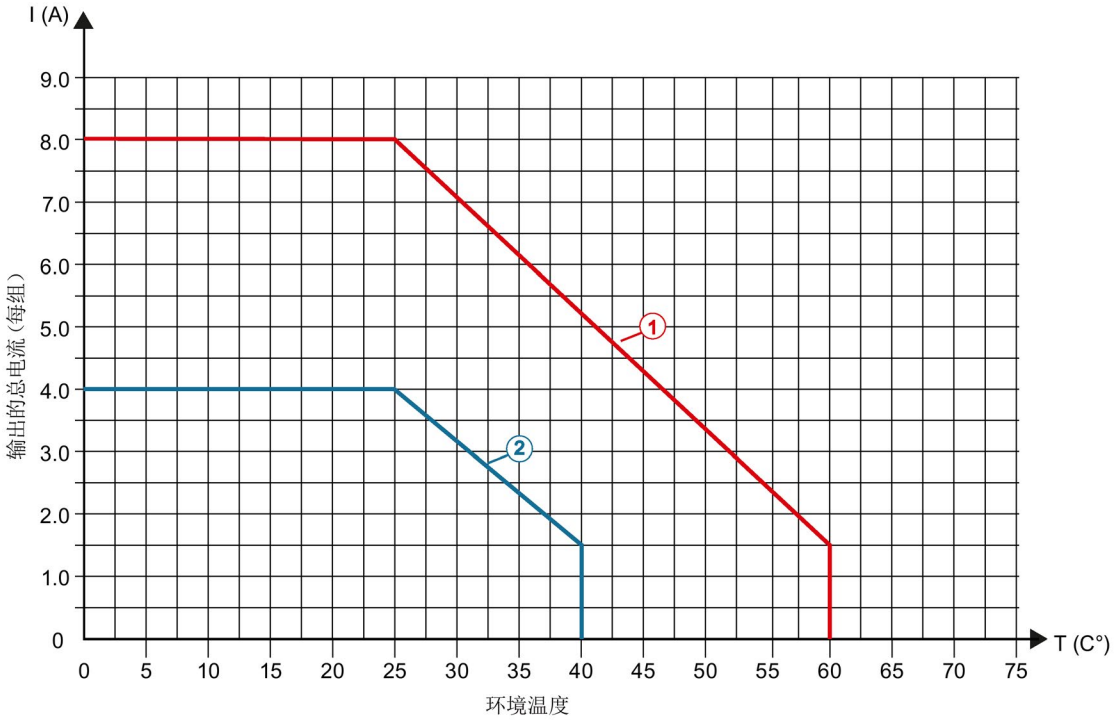


① 水平安装时
② 垂直安装时

图 6-1 DQ 和 PWM 操作模式下，输出总电流详细信息（每组）

PWM 模式下，最大开关频率为 500Hz

下图显示了各通道的最大输出总电流为 2 A 时的阻性负载和感性负载。有关额外连接外部二极管时所需的感性负载，请参见“接线 (页 16)”部分。有关各通道或各模块中输出的总电流，请参见技术规范。



① 水平安装时
② 垂直安装时

图 6-2 PWM 操作模式下，输出总电流详细信息（每组）

尺寸图

A

在附录中提供模块在安装轨道上的尺寸图，以及带前盖的尺寸图。 应始终遵守在机柜、控制室等空间内安装时的指定尺寸。

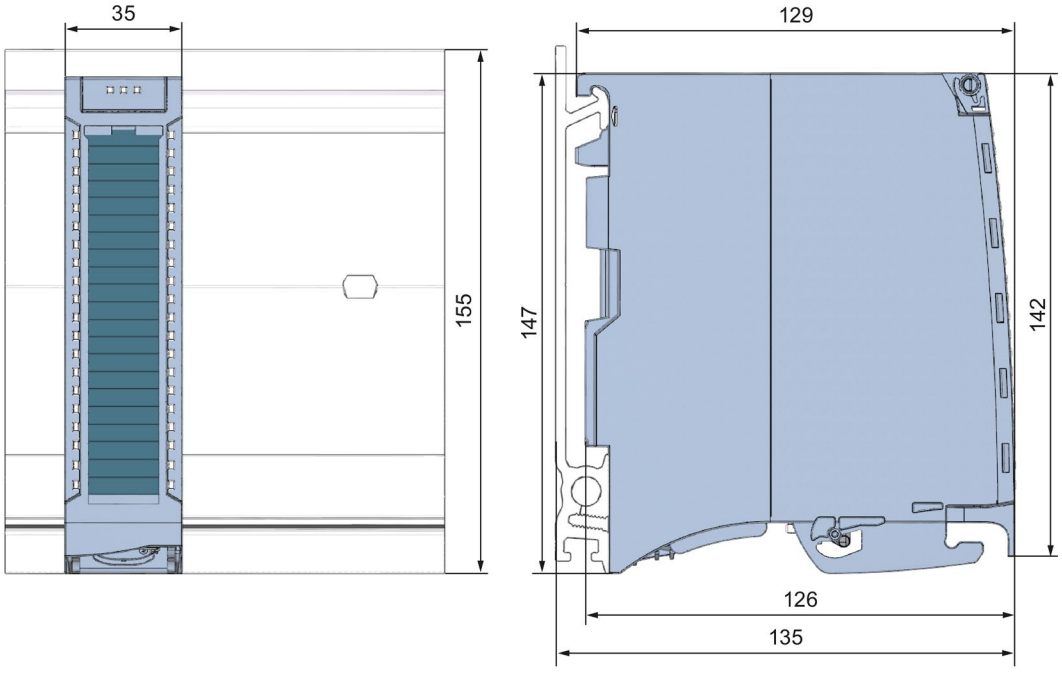


图 A-1　　DQ 8x24VDC/2A HF 模块的尺寸图

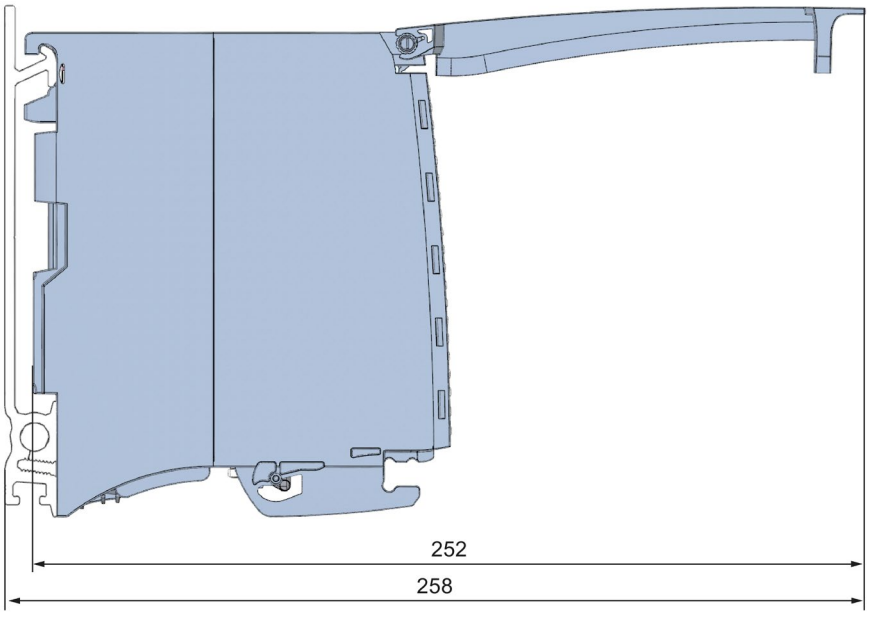


图 A-2　　DQ 8x24VDC/2A HF 模块的尺寸图，带开放式前盖的侧视图

参数数据记录

B

B.1 参数分配和参数数据记录的结构

模块数据记录的结构相同，而与是否通过 PROFIBUS DP 或 PROFINET IO 组态模块无关。

GSD 文件与组态的相关性

使用 GSD 文件组态模块时，在进行“分配参数”时将采用 GSD 文件中数据。

但与该模块没有相关性。可按不同的组合形式进行参数分配。

用户程序中的参数分配

可在 RUN 模式下对该模块进行重新组态（例如，在 RUN 模式下更改所选通道对 CPU-STOP 状态的响应，而不影响其它通道）。

RUN 模式下的参数分配

WRREC 指令用于基于数据记录 64 到 71，将参数传送到模块中。STEP 7 中设置的参数在 CPU 中保持不变。即，重新启动后，STEP 7 中设置的参数后仍然有效。

在传送后，模块仅对参数进行真实性检查。

输出参数 STATUS

模块将忽略在 WRREC 指令传输参数期间发生的错误，并继续使用之前的参数分配进行操作。但会将相应的错误代码写入 STATUS 输出参数中。

有关 WRREC 指令的说明和错误代码，请参见 STEP 7 在线帮助。

分配数据记录和通道

模块的通道参数包含在数据记录 64 到 71 中，具体分配情况如下所示：

- 数据记录 64 对应通道 0（支持 PWM 操作模式）
- 数据记录 65 对应通道 1
- 数据记录 66 对应通道 2
- 数据记录 67 对应通道 3
- 数据记录 68 对应通道 4（支持 PWM 操作模式）
- 数据记录 69 对应通道 5
- 数据记录 70 对应通道 6
- 数据记录 71 对应通道 7

数据记录结构

下图举例说明了通道 0 中数据记录 64 的结构。通道 1 到 7 的结构相同字节 0 和字节 1 中的值为固定值，不可更改。

通过将相应位设置为“1”，启用参数。

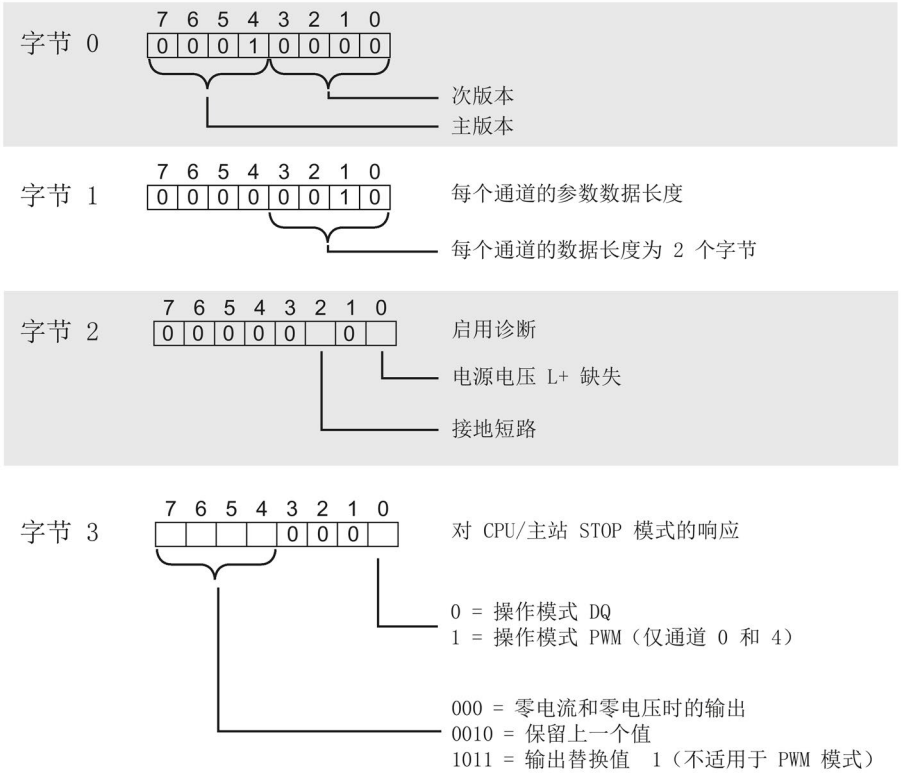


图 B-1　　数据记录 64 的结构：字节 0 到 3

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