

SIEMENS



# SIMATIC

## S7-1500

数字量输入模块 DI 16x230VAC BA (6ES7521-1FH00-0AA0)

手册

版本

07/2014

Answers for industry.

SIEMENS

SIMATIC

S7-1500/ET 200MP  
DI 16x230VAC BA 数字量输入模块  
(6ES7521-1FH00-0AA0)




设备手册

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法律资讯

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。

 <b>危险</b>
表示如果不采取相应的小心措施， <b>将会</b> 导致死亡或者严重的人身伤害。
 <b>警告</b>
表示如果不采取相应的小心措施， <b>可能</b> 导致死亡或者严重的人身伤害。
 <b>小心</b>
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。
<b>注意</b>
表示如果不采取相应的小心措施，可能导致财产损失。


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。

按规定使用Siemens 产品

请注意下列说明：

 <b>警告</b>
<b>Siemens</b> 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 <b>Siemens</b> 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。

商标

所有带有标记符号 ® 的都是西门子股份有限公司的注册商标。本印刷品中的其他符号可能是一些其他商标。  
若第三方出于自身目的使用这些商标，将侵害其所有者的权利。

责任免除

我们已对印刷品中所述内容与硬件和软件的一致性作过检查。然而不排除存在偏差的可能性，因此我们不保证印刷品中所述内容与硬件和软件完全一致。印刷品中的数据都按规定经过检测，必要的修正值包含在下一版本中。

# 前言

## 本文档的用途

本手册是对以下系统手册的补充：

- S7-1500 自动化系统
- ET 200MP 分布式 I/O 系统

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：

- 硬件目录 STEP 7 (TIA Portal) V13 Update 3  
或更高版本中集成了具有以下功能的模块：
  - 模块内部共享输入 (MSI)，适用于 Shared Device
  - 可组态子模块，如适用于 Shared Device
- 已修订的附录 Open Source Software

## 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：

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### 说明

注释信息中包含本文档中所介绍产品及其操作的重要信息，或者本文档中应特别注意的部分。

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## 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。

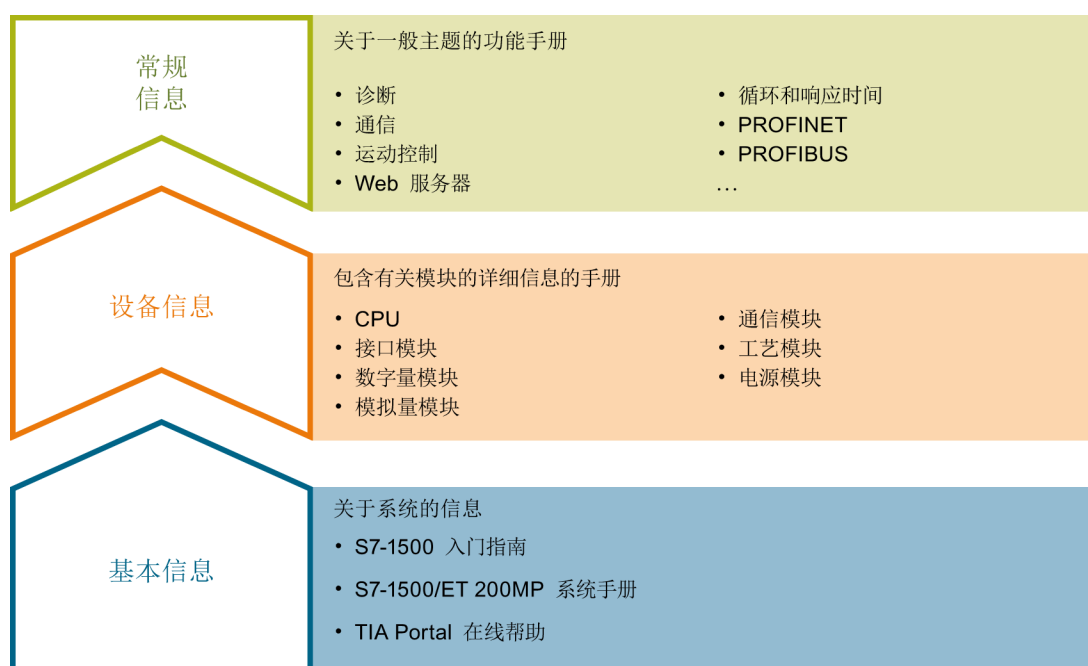
出于法律上的原因，我们有责任原文公布许可条件和版权提示。相关信息请参见附录。

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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。

这样用户可方便访问自己所需的特定内容。



## 基本信息

系统手册和入门指南中详细描述了 SIMATIC S7-1500 和 ET 200MP 系统的组态、安装、接线和调试。STEP 7 在线帮助用户提供了组态和编程方面的支持。

## 设备信息

手册中包含模块特定信息的简洁描述，如属性、端子图、功能特性、技术规范。

## 常规信息

功能手册中包含有关 SIMATIC S7-1500 和 ET 200MP 系统的常规主题的详细描述，如诊断、通信、运动控制、Web 服务器。

可以从 Internet (<http://www.automation.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-controllers/Pages/Default.aspx>) 上免费下载文档。

产品信息中记录了对这些手册的更改和补充。

## 手册集 S7-1500 / ET 200MP

手册集中包含 SIMATIC S7-1500 自动化系统和 ET 200MP 分布式 I/O 系统的完整文档，这些文档都收集在一个文件中。

可以在 Internet (<http://support.automation.siemens.com/WW/view/zh/86140384>) 上找到手册集。

## 我的文档管理器

“我的文档管理器”用于将完整手册或部分手册组合成用户自己的手册。用户可以将该手册导出为 PDF 文件或可供稍后进行编辑的格式。

可以在 Internet (<http://support.automation.siemens.com/CN/view/zh/38715968>) 上找到“我的文档管理器”。

## 应用程序和工具

“应用程序和工具”提供使用各种工具的支持和用于解决自动化任务的各种示例。自动化系统中的多个组件完美协作，从而组合成不同的解决方案，而用户则无需关注各个单独的产品。

可以在 Internet (<http://support.automation.siemens.com/WW/view/zh/20208582>) 上找到“应用程序和工具”。

## CAX 下载管理器

CAX 下载管理器用于访问 CAX 或 CAe 系统的最新产品数据。

仅需几次单击用户即可组态自己的下载包。

用户可选择：

- 产品图片、2 维图、3 维模型、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

可以在 Internet (<https://support.automation.siemens.com/CN/view/zh/42455541>) 上找到 CAX 下载管理器。



## 产品总览

### 2.1 特性

产品编号

6ES7521-1FH00-0AA0

模块视图

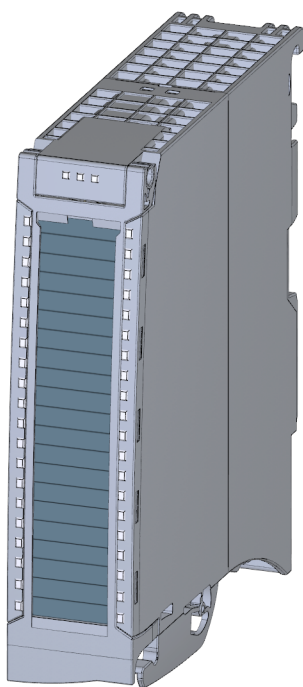


图 2-1 DI 16x230VAC BA 模块的视图

## 2.1 特性

## 特性

该模块具有下列技术特性：

- 16 路数字量输入，以 4 个为一组进行电隔离
- 额定输入电压 120/230 V AC
- 适用于开关以及 2-/3-/4 线 AC 接近开关（交流电压）

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	√
模块内部 Shared Input (MSI)	V2.0.0 或更高版本	V13 Update 3 或更高版本 (仅限 PROFINET IO)	√ (仅限 PROFINET IO)
可组态子模块/ Shared Device 子模块	V2.0.0 或更高版本	V13 Update 3 或更高版本 (仅限 PROFINET IO)	√ (仅限 PROFINET IO)
可在接口模块 IM 155-5 DP ST 后组态	V2.0.0 或更高版本	V13 或更高版本	√

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

## 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

有关附件的详细信息，请参见“S7-1500 自动化系统

(<http://support.automation.siemens.com/WW/view/zh/59191792>)”系统手册和“ET 200MP 分布式 I/O 系统

(<http://support.automation.siemens.com/WW/view/zh/59193214>)”系统手册。

## 接线

下面介绍了模块的方框图以及各种连接方式。

有关前连接器接线和连接电缆屏蔽层等的更多信息，请参见“S7-1500 自动化系统 (<http://support.automation.siemens.com/WW/view/zh/59191792>)”和“ET 200MP 分布式 I/O 系统 (<http://support.automation.siemens.com/WW/view/zh/59193214>)”系统手册中的“接线”部分。

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### 说明

请勿插入前连接器附带的电位跳线！

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## 使用的缩写

下图中所用缩写的含义：

xN	电源电压连接 AC
CHx	通道或通道状态指示灯

# 接线图和方框图

下图显示了如何连接该模块以及如何进行通道寻址（输入字节 **a** 到输入字节 **b**）。

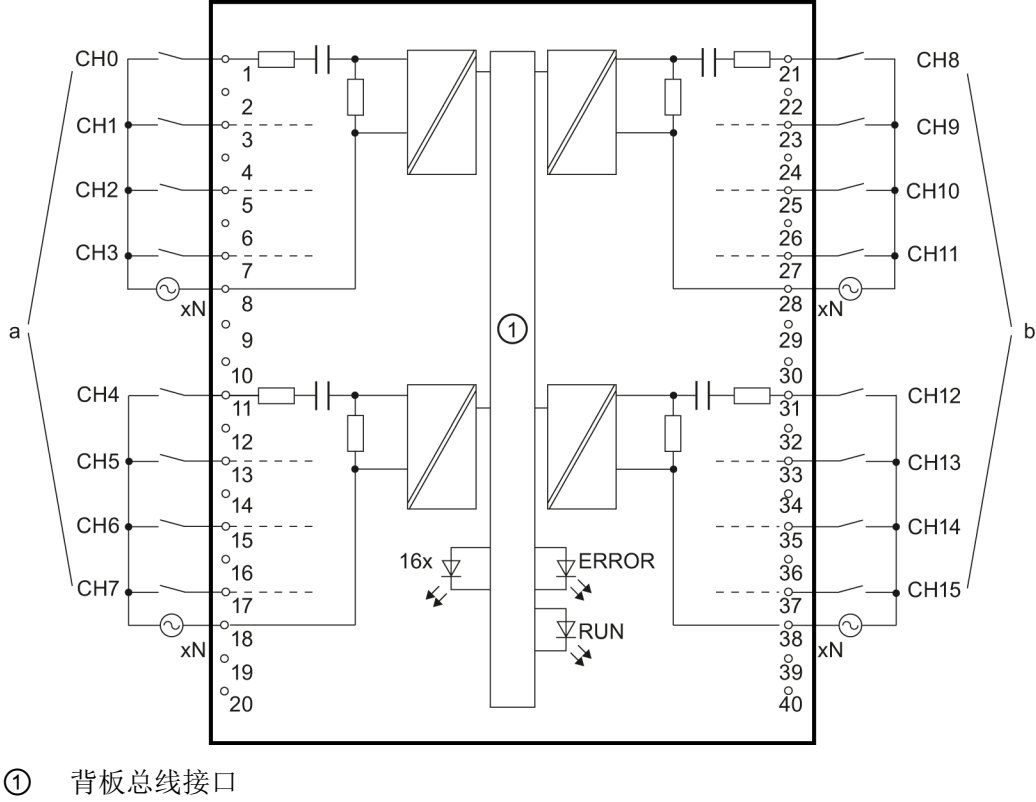


图 3-1 方框图和端子分配

## 地址空间

### 4.1 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，将在输入的过程映像中另外指定地址或指定不同地址。

在模块上将印刷字母“a 到 d”。"例如，“IB a”是指模块起始地址输入字节 a。

#### DI 16x230VAC BA 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 4-1 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 16 通道（不带值状态）	DI 16x230VAC BA	V12 或更高版本	√
2 x 8 通道（不带值状态）	DI 16x230VAC BA S	V13 Update 3 或更高版本 (仅限 PROFINET IO)	√ (仅限 PROFINET IO)
1 x 16 通道（带最多 4 个子模块中模块内部共享输入的值状 态）	DI 16x230VAC BA MSI	V13 Update 3 或更高版本 (仅限 PROFINET IO)	√ (仅限 PROFINET IO)

值状态 (Quality Information, QI)

模块 DI 16x230VAC BA MSI 将始终激活值状态。

对于值状态，系统将为每个通道指定一个附加位。

与具有诊断功能的模块不同，该模块在值状态中仅指示与第一个子模块（基本子模块）参数分配相关的信息。

但该模块不会为读取的数字值设置值状态。

组态为 DI 16x230VAC BA 的地址空间

下图显示了组态为 16 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。

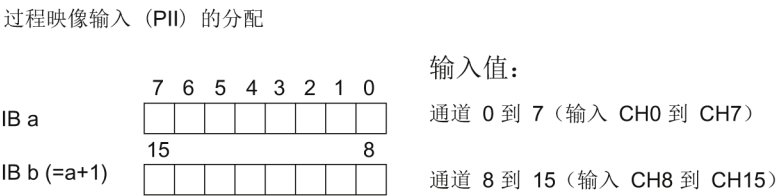


图 4-1 组态为 16 通道 DI 16x230VAC BA 的地址空间

组态为 2 x 8 通道 DI 16x230VAC BA S 的地址空间

组态为 2 x 8 通道模块时，模块的通道应分为多个子模块。

在共享设备中使用该模块时，可将子模块分配给不同的 IO 控制器。

可用的子模块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。

与 1 x 16 通道模块组态不同，这 2 个子模块都可任意指定起始地址。

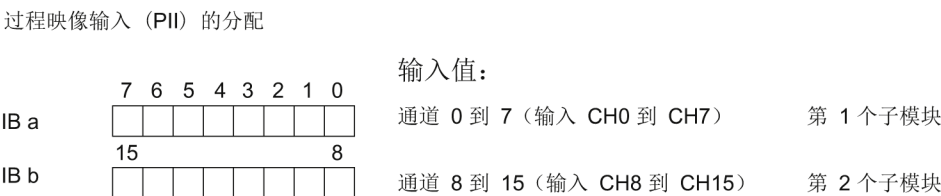


图 4-2 组态为 2 x 8 通道 DI 16x24VDC SRC BA S 的地址空间

组态为 1 x 16 通道 DI 16x230VAC BA MSI 的地址空间

组态 1 x 16 通道模块（模块内部共享输入，MSI）时，可在最多 4 个子模块中复制模块的通道 0 到 15。之后，在不同的子模块中通道 0 到 15 将具有相同的输入值。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。每个 IO 控制器都具有对这些通道的读访问权限。

可用的子模块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），将不考虑该子模块的值状态。

对于第二到第四个子模块（= MSI 子模块），值状态为 0 表示基本子模块参数尚未分配（未就绪）。

下图显示了子模块 1 和 2 的地址空间分配。



图 4-3 组态为 1 x 16 通道 DI 16x230VAC BA MSI 的地址空间



下图显示了子模块 3 和 4 的地址空间分配。

第 3 和第 4 个子模块上过程映像输入 (PII) 中的分配



图 4-4 组态为 1 x 16 通道 DI 16x230VAC BA MSI 的地址空间

## 诊断报警

### 5.1 状态和错误指示灯

#### LED 指示灯

下图显示了 DI 16x230VAC BA 的 LED 指示灯（状态和错误指示灯）。

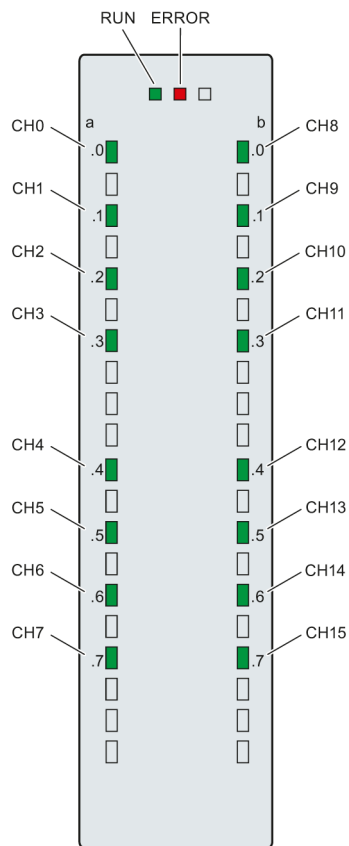


图 5-1 LED 模块的指示灯DI 16x230VAC BA

## LED 指示灯的含义

下表列出了状态和错误指示灯的含义。

## 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。	<ul style="list-style-type: none"> <li>接通 CPU 和/或系统电源模块。</li> <li>验证是否插入 U 型连接器。</li> <li>检查是否插入了过多的模块。</li> </ul>
⚡ 闪烁	□ 灭	模块启动	---
■ 亮	□ 灭	模块准备就绪	
⚡ 闪烁	⚡ 闪烁	硬件故障。	更换模块。

## CHx LED 指示灯

表格 5-2 CHx 状态指示灯

LED CHx	含义	解决方法
□ 灭	0 = 输入信号的状态	---
■ 亮	1 = 输入信号的状态	---

## 技术规范

## DI 16x230VAC BA 的技术规范

	6ES7521-1FH00-0AA0
产品类型标识	DI 16x230VAC BA
<b>常规信息</b>	
硬件版本	E01
固件版本	V2.0.0
<b>产品功能</b>	
I&M 数据	√; IM0 到 IM3
<b>工程组态方式</b>	
TIA Portal 中 STEP 7	V12.0 / V12.0
可组态的版本/可集成的版本（或更高版本）	
STEP 7	V5.5 SP3 或更高版本 / -
可组态的版本/可集成的版本（或更高版本）	
<b>运行方式</b>	
MSI	√
<b>功率</b>	
背板总线上的功耗	1 W
<b>功耗</b>	
典型功耗	4.9 W
<b>数字量输入</b>	
输入数量	16
读取 m/p	读取 p
输入特性曲线符合 IEC 61131，类型 1	√

	6ES7521-1FH00-0AA0
<b>输入电压</b>	
输入电压的类型	AC
交流额定电压	230 V; 120/230 V AC; 60/50Hz
信号“0”	0 到 40 V AC
信号“1”	79 到 264 V AC
<b>输入电流</b>	
信号“1”，典型值	230 V AC 时，11 mA; 120 V AC 时，5.5 mA
<b>输入延时（在输入额定电压时）</b>	
标准输入	
• 可组态	-
• 从“0”到“1”时的最长时间	25 ms
• 从“1”到“0”时的最长时间	25 ms
中断输入	
• 可组态	-
<b>电缆长度</b>	
屏蔽电缆的最大长度	1000 m
未屏蔽电缆的最大长度	600 m
<b>编码器</b>	
<b>可连接的编码器</b>	
2 线制传感器	√
• 允许的最大静态电流（2 线制传感器）	2 mA
<b>等时同步模式</b>	
等时同步模式（应用程序最多同步到终端）	-
<b>中断/诊断/状态信息</b>	
<b>中断</b>	
诊断中断	-
硬件中断	-

	6ES7521-1FH00-0AA0
<b>诊断报警</b>	
电源电压监视	-
断路	-
短路	-
熔断器熔断	-
<b>诊断指示器 LED 指示灯</b>	
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	-
通道状态显示	√; 绿色 LED 指示灯
通道诊断	-
模块诊断	√; 红色 LED 指示灯
<b>电气隔离</b>	
<b>通道的电气隔离</b>	
通道之间	-
通道之间, 每组个数	4
通道和背板总线之间	√
<b>允许的电位差</b>	
不同电路之间	通道和背板总线之间为 250 V AC; 通道之间为 500 V AC
<b>绝缘</b>	
绝缘测试	2500 V DC
<b>分布式模式</b>	
优先化启动	√
<b>尺寸</b>	
宽	35 mm
高	147 mm
深	129 mm
<b>重量</b>	
约重	300 g



## 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。请务必遵循在控制柜、控制室等地方安装时的具体尺寸要求。

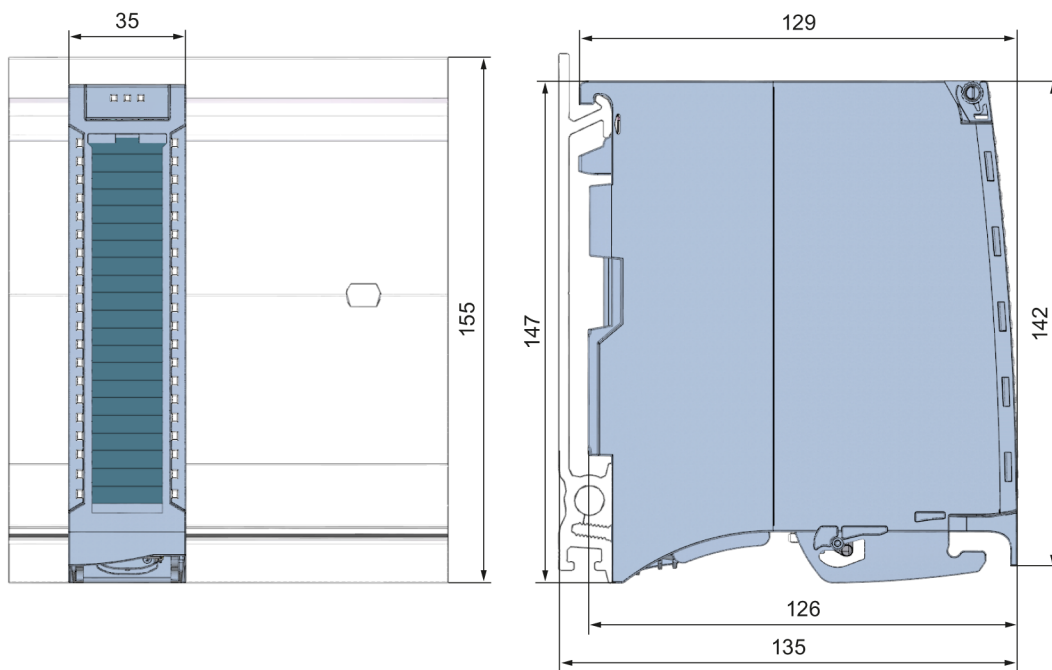


图 A-1 DI 16x24VAC BA 模块的尺寸图



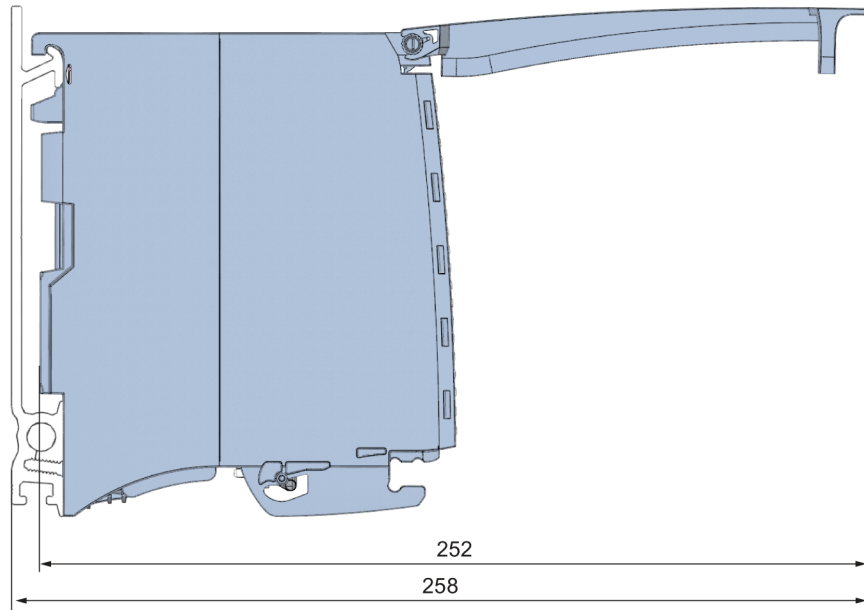


图 A-2 DI 16x24VAC BA 模块的尺寸图，带开放式前盖的侧视图

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