



SIMATIC

S7-1500 / ET 200MP

Digital input module DI 32x24VDC BA (6ES7521-1BL10-0AA0)

Manual

Edition

09/2014

S7-1500/ET 200MP Digital input module DI 32x24VDC BA (6ES7521-1BL10-0AA0)

Manual

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Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

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Preface

Purpose of the documentation

This product manual supplements the system manuals:

- S7-1500 Automation System
- ET 200MP Distributed I/O System

Functions that relate in general to the systems are described in these system manuals.

The information provided in this product manual and in the system/function manuals supports you in commissioning the systems.

Changes compared to previous version

Compared to the previous version, this product manual includes detailed information on the module functions, for example, as of which STEP 7 version the function is supported.

Conventions

The term "CPU" is used in this manual both for the CPUs of the S7-1500 automation system, as well as for interface modules of the ET 200MP distributed I/O system.

Please also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product or on the section of the documentation to which particular attention should be paid.

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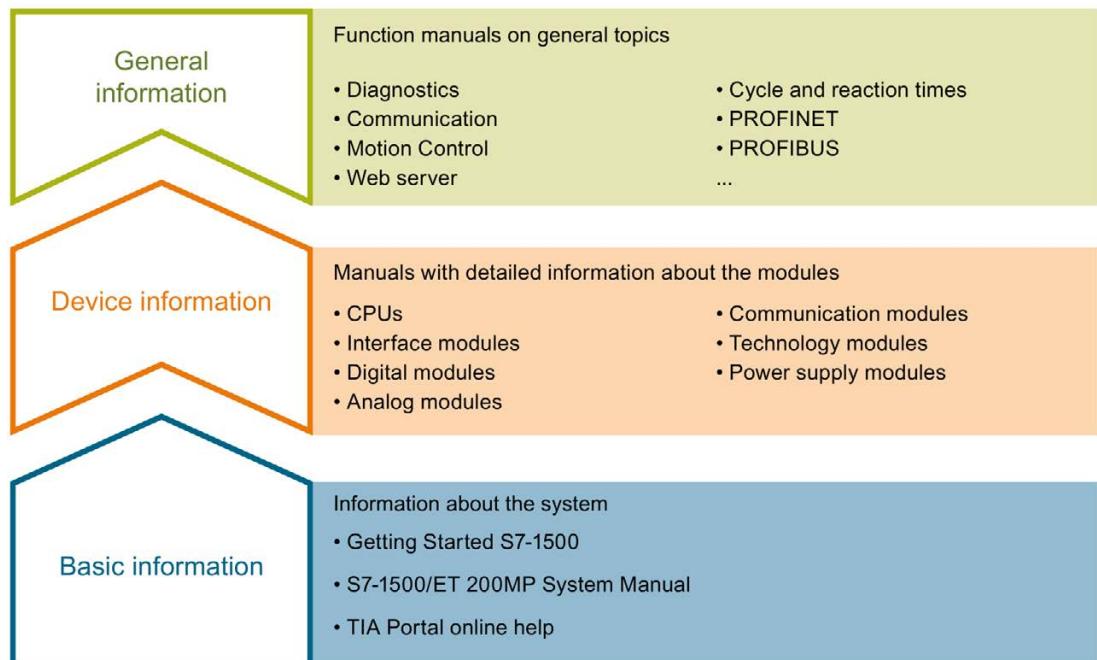
For legal reasons, we are obliged to publish the original text of the license conditions and copyright notices. Please read the information relating to this in the appendix.

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Documentation guide

The documentation for the SIMATIC S7-1500 automation system and the SIMATIC ET 200MP distributed I/O system is arranged into three areas.
This arrangement enables you to access the specific content you require.



Basic information

System Manual and Getting Started describe in detail the configuration, installation, wiring and commissioning of the SIMATIC S7-1500 and ET 200MP systems. The STEP 7 online help supports you in the configuration and programming.

Device information

Manuals contain a compact description of the module-specific information, such as properties, terminal diagrams, characteristics, technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC S7-1500 and ET 200MP systems, e.g. diagnostics, communication, Motion Control, Web server.

You can download the documentation free of charge from the Internet (<http://www.automation.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-controllers/Pages/Default.aspx>).

Changes and supplements to the manuals are documented in a Product Information.

Manual Collection S7-1500 / ET 200MP

The Manual Collection contains the complete documentation on the SIMATIC S7-1500 automation system and the ET 200MP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet
(<http://support.automation.siemens.com/WW/view/en/86140384>).

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- Manuals, characteristics, operating manuals, certificates
- Product master data

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2

Product overview

2.1 Properties

Part number:

6ES7521-1BL10-0AA0

View of the module

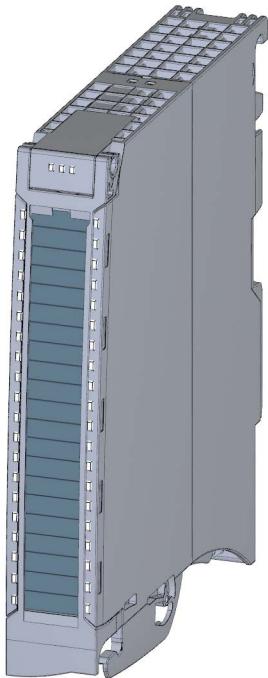


Figure 2-1 View of the DI 32x24VDC BA module

Properties

The module has the following technical properties:

- 32 digital inputs; electrically isolated in groups of 16
- Rated input voltage 24 VDC
- Suitable for switches and 2-/3-/4-wire proximity switches
- Hardware compatible with digital input module DI 16x24VDC BA (6ES7521-1BH10-0AA0)

The module supports the following functions:

Table 2- 1 Version dependencies of the module functions

Function	Firmware version of the module	Configuration software	
		STEP 7 (TIA Portal)	GSD file in STEP 7 (TIA Portal) V12 or higher, or STEP 7 V5.5 SP3 or higher
Firmware update	V1.0.0 or higher	V13 or higher	X
Identification data I&M0 to I&M3	V1.0.0 or higher	V13 or higher	X
Module internal shared input (MSI)	V1.0.0 or higher	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
Configurable submodules / submodules for Shared Device	V1.0.0 or higher	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)

You can configure the module with STEP 7 (TIA Portal) and with a GSD file.

Accessories

The following accessories are supplied with the module and can also be ordered separately as spare parts:

- Front connector (push-in terminals) including cable tie
- Labeling strips
- U connector
- Universal front door

You can find more information on accessories in the S7-1500 Automation System (<http://support.automation.siemens.com/WW/view/en/59191792>) system manual and the ET 200MP Distributed I/O System (<http://support.automation.siemens.com/WW/view/en/59193214>) system manual.

3.1 Wiring and block diagram

This section contains the block diagram of the module and outlines various connection options.

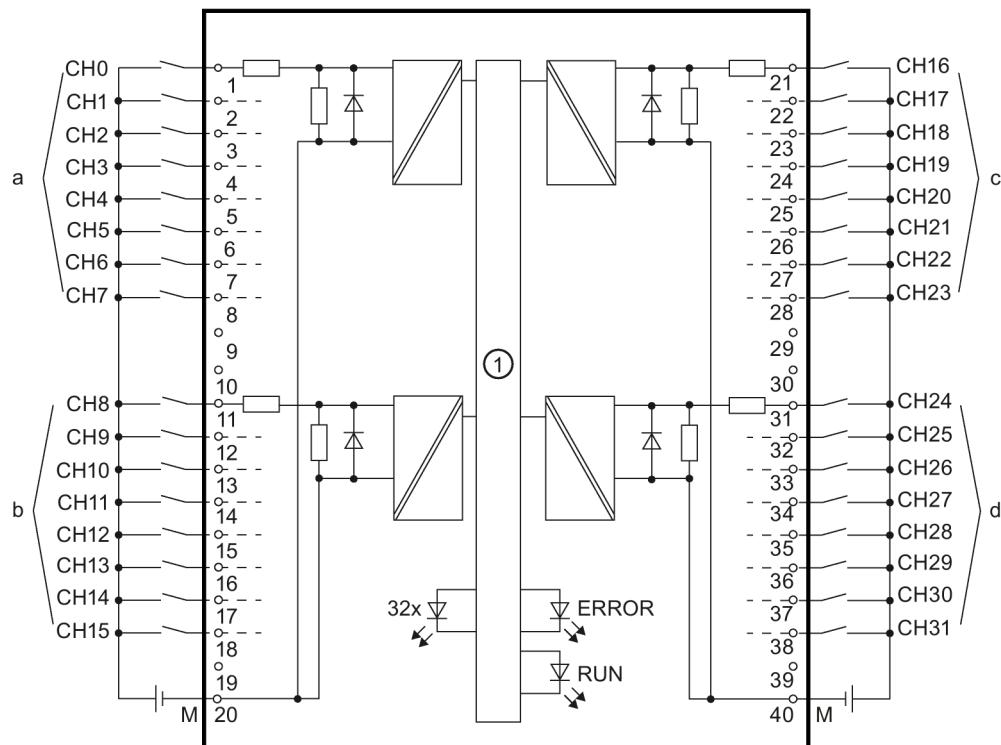
For more information on front connector wiring and creating cable shields, for example, refer to the "Wiring" section in the S7-1500 Automation System (<http://support.automation.siemens.com/WW/view/en/59191792>) and ET 200MP Distributed I/O System (<http://support.automation.siemens.com/WW/view/en/59193214>) system manuals.

Abbreviations used

Meaning of the abbreviations used in the following figure:

M	Ground connector
CHx	Channel or display for the channel status

The figure below shows you how to connect the module and the assignment of the channels to the addresses (input byte a to input byte d).



① Backplane bus interface

Figure 3-1 Block diagram and terminal assignment

Address space

4.1 Address space

The module can be configured in various ways in STEP 7. Depending on the configuration, additional/different addresses are assigned in the process image of the inputs.

Configuration options of DI 32x24VDC BA

You can configure the module with STEP 7 (TIA Portal) or with a GSD file.

When you configure the module by means of the GSD file, the configurations are available under different abbreviations/module names.

The following configurations are possible:

Table 4- 1 Configuration options

Configuration	Short designation/ module name in the GSD file	Configuration software, e.g., with STEP 7 (TIA Portal)	
		Integrated in hard- ware catalog STEP 7 (TIA Portal)	GSD file in STEP 7 (TIA Portal) V12 or higher or STEP 7 V5.5 SP3 or higher
1 x 32-channel without value status	DI 32x24VDC BA	V13 or higher	X
4 x 8-channel without value status	DI 32x24VDC BA S	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)
1 x 32-channel with value status for module- internal Shared Input with up to 4 submodules	DI 32x24VDC BA MSI	V13 Update 3 or higher (PROFINET IO only)	X (PROFINET IO only)

Address space for configuration as 1 x 32-channel DI 32x24VDC BA

The figure below shows the address space assignment for configuration as a 1 x 32-channel module. You can freely assign the start address for the module. The addresses of the channels are based on the start address.

The letters "a" to "d" are printed on the module. "EB a", for example, stands for module start address input byte a.

Assignment in the process image input (PII)

	7	6	5	4	3	2	1	0	Input value:
IB a	<input type="text"/>	Channel 0 through 7 (input CH0 through CH7)							
	15							8	
IB b (=a+1)	<input type="text"/>	Channel 8 through 15 (input CH8 through CH15)							
	23							16	
IB c (=a+2)	<input type="text"/>	Channel 16 through 23 (input CH16 through CH23)							
	31							24	
IB d (=a+3)	<input type="text"/>	Channel 24 through 31 (input CH24 through CH31)							

Figure 4-1 Address space for configuration as 1 x 32-channel DI 32x24VDC BA

Address space for configuration as 4 x 8-channel DI 32x24VDC BA S

For the configuration as a 4 x 8-channel module, the channels of the module are divided into multiple submodules. The submodules can be assigned to different IO controllers when the module is used in a Shared Device.

Unlike the 1 x 32-channel module configuration, each of the four submodules has a freely assignable start address.

Assignment in the process image of the input (PII)

	7	6	5	4	3	2	1	0	Input value:	
IB a	<input type="text"/>	Channel 0 to 7 (input CH0 to CH7)	1st submodule							
	15							8		
IB b	<input type="text"/>	Channel 8 to 15 (input CH8 to CH15)	2nd submodule							
	23							16		
IB c	<input type="text"/>	Channel 16 to 23 (input CH16 to CH23)	3rd submodule							
	31							24		
IB d	<input type="text"/>	Channel 24 to 31 (input CH24 to CH31)	4th submodule							

Figure 4-2 Address space for configuration as 4 x 8-channel DI 32x24VDC BA S

Address space for configuration as 1 x 32-channel DI 32x24VDC BA MSI

The channels 0 to 31 of the module are copied to up to 4 submodules with configuration 1 x 32-channel module (Module-internal Shared Input, MSI). Channels 0 to 31 are then available with identical input values in different submodules. These submodules can be assigned to up to four IO controllers when the module is used in a Shared Device. Each IO controller has read access to the same channels.

The number of usable submodules depends on the interface module used. Please observe the information in the manual for the particular interface module.

Value status (Quality Information, QI)

The meaning of the value status depends on the submodule involved.

For the 1st submodule (=basic submodule), the value status is not relevant.

For the 2nd to 4th submodule (=MSI submodule), the value status 0 indicates that the value is incorrect or the basic submodule has not yet been configured (not ready for operation).

Address space

4.1 Address space

The figure below shows the assignment of the address space with submodules 1 and 2.

Assignment in the process image input (PII) for 1st and 2nd submodule

		Input value of 1st submodule (basic submodule):							
IB a		7	6	5	4	3	2	1	0
		[]	[]	[]	[]	[]	[]	[]	[]
		15							8
IB (=a+1)		[]	[]	[]	[]	[]	[]	[]	[]
		23							16
IB (=a+2)		[]	[]	[]	[]	[]	[]	[]	[]
		31							24
IB (=a+3)		[]	[]	[]	[]	[]	[]	[]	[]
		7	6	5	4	3	2	1	0
IB (=a+4)		[]	[]	[]	[]	[]	[]	[]	[]
		15							8
IB (=a+5)		[]	[]	[]	[]	[]	[]	[]	[]
IB (=a+6)		[]	[]	[]	[]	[]	[]	[]	[]
IB (=a+7)		[]	[]	[]	[]	[]	[]	[]	[]
		23							16
		31							24
		7	6	5	4	3	2	1	0
IB b		[]	[]	[]	[]	[]	[]	[]	[]
		15							8
IB (=b+1)		[]	[]	[]	[]	[]	[]	[]	[]
		23							16
IB (=b+2)		[]	[]	[]	[]	[]	[]	[]	[]
		31							24
IB (=b+3)		[]	[]	[]	[]	[]	[]	[]	[]
		7	6	5	4	3	2	1	0
IB (=b+4)		[]	[]	[]	[]	[]	[]	[]	[]
		15							8
IB (=b+5)		[]	[]	[]	[]	[]	[]	[]	[]
IB (=b+6)		[]	[]	[]	[]	[]	[]	[]	[]
IB (=b+7)		[]	[]	[]	[]	[]	[]	[]	[]
		23							16
		31							24

0 = value read in on channel is faulty

Figure 4-3 Address space for configuration as 1 x 32-channel DI 32x24VDC BA MSI with value status

The figure below shows the assignment of the address space with submodules 3 and 4.

Assignment in the process image input (PII) for 3rd and 4th submodule

	Input value of 3rd submodule (MSI submodule):							
IB c	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	15							8
IB (=c+1)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	23							16
IB (=c+2)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	31							24
IB (=c+3)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	24							
	Channel 0 through 7 (input CH0 through CH7)							
	Channel 8 through 15 (input CH8 through CH15)							
	Channel 16 through 23 (input CH16 through CH23)							
	Channel 24 through 31 (input CH24 through CH31)							
IB (=c+4)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	15							8
IB (=c+5)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	23							16
IB (=c+6)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	31							24
IB (=c+7)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	Channel 0 through 7 (value status QI0 through QI7)							
	Channel 8 through 15 (value status QI8 through QI15)							
	Channel 16 through 23 (value status QI16 through QI23)							
	Channel 24 through 31 (value status QI24 through QI31)							
IB d	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	15							8
IB (=d+1)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	23							16
IB (=d+2)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	31							24
IB (=d+3)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	Channel 0 through 7 (input CH0 through CH7)							
	Channel 8 through 15 (input CH8 through CH15)							
	Channel 16 through 23 (input CH16 through CH23)							
	Channel 24 through 31 (input CH24 through CH31)							
IB (=d+4)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	15							8
IB (=d+5)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	23							16
IB (=d+6)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	31							24
IB (=d+7)	7	6	5	4	3	2	1	0
	[]	[]	[]	[]	[]	[]	[]	[]
	Channel 0 through 7 (value status QI0 through QI7)							
	Channel 8 through 15 (value status QI8 through QI15)							
	Channel 16 through 23 (value status QI16 through QI23)							
	Channel 24 through 31 (value status QI24 through QI31)							
0 = value read in on channel is faulty								

Figure 4-4 Address space for configuration as 1 x 32-channel DI 32x24VDC BA MSI with value status

Diagnostics alarms

The module has no selectable diagnostics. Diagnostics alarms, for example, cannot be output with STEP 7 (TIA Portal).

5.1 Status and error displays

LED displays

The figure below shows you the LED displays (status and error displays) of the DI 32x24VDC BA.

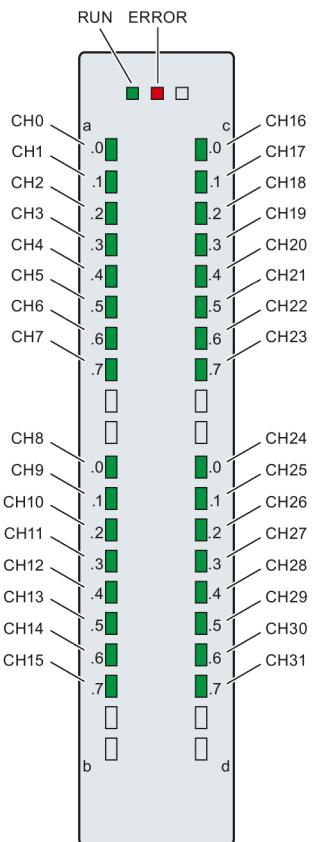


Figure 5-1 LED displays of the module DI 32x24VDC BA

Meaning of the LED displays

The tables below explain the meaning of the status and error displays.

LED RUN/ERROR

Table 5- 1 RUN/ERROR status and error displays

LED		Meaning	Remedy
RUN	ERROR		
Off	Off	Voltage missing or too low at backplane bus.	<ul style="list-style-type: none"> • Switch on the CPU and/or the system power supply modules. • Verify that the U connectors are inserted. • Check to see if too many modules are inserted.
Flashes	Off	Module is starting up.	---
On	Off	Module is ready.	---
Flashes	Flashes	Hardware defective.	Replace the module.

LED CHx

Table 5- 2 CHx status display

LED CHx	Meaning	Remedy
Off	0 = Status of the input signal.	---
On	1 = Status of the input signal.	---

6

Technical specifications

Technical specifications of the DI 32x24VDC BA

6ES7521-1BL10-0AA0	
Product type designation	DI 32x24VDC BA
General information	
Hardware version	E01
Firmware version	V1.0.0
Product function	
I&M data	Yes; I&M0 to I&M3
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V13 / V13
STEP 7 can be configured/integrated as of version	V5.5 SP3 / -
Operating mode	
MSI	Yes
Supply voltage	
Type of supply voltage	DC
Rated value (DC)	24 V
Permitted range, low limit (DC)	20.4 V
Permitted range, high limit (DC)	28.8 V
Power	
Power taken from the backplane bus	1.05 W
Power loss	
Power loss, typ.	3 W
Digital inputs	
Number of inputs	32
Sinking/sourcing input	Sinking input
Input characteristic curve acc. to IEC 61131, type 3	Yes
Input voltage	
Rated value, DC	24
for signal "0"	-30 to +5 V
for signal "1"	11 to 30 V
Permitted voltage at input, min.	-30 V; -3 V permanently; -30 V brief reverse polarity protection
Permitted voltage at input, max.	30 V
Input current	
for signal "1", typ.	2.7 mA

	6ES7521-1BL10-0AA0
Input delay (for rated value of input voltage)	
For standard inputs	
• Configurable	No
• with "0" to "1", min.	3 ms
• with "0" to "1", max.	4 ms
• with "1" to "0", min.	3 ms
• with "1" to "0", max.	4 ms
For interrupt inputs	
• Configurable	No
Cable length	
Cable length shielded, max.	1000 m
Cable length unshielded, max.	600 m
Encoders	
Connectable encoders	
2-wire sensor	Yes
• Permitted quiescent current (2-wire sensor), max.	1.5 mA
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	No
Interrupts/diagnostics/status information	
Interrupts	
Diagnostics interrupt	No
Hardware interrupt	No
Diagnostics alarms	
Diagnostics	No
Monitoring of the supply voltage	No
Wire break	No
Short-circuit	No
Fuse blown	No
Diagnostics indicator LED	
RUN LED	Yes; green LED
ERROR LED	Yes; red LED
MAINT LED	No
Monitoring of the supply voltage	No
Channel status display	Yes; green LED
For channel diagnostics	No
For module diagnostics	No

	6ES7521-1BL10-0AA0
Electrical isolation	
Electrical isolation of channels	
Between the channels	No
Between the channels, in groups of	16
Between the channels and the backplane bus	Yes
Between the channels and the supply voltage of the electronics	No
Permitted potential difference	
Between different circuits	75 VDC / 60 VAC (basic isolation)
Isolation	
Isolation tested with	707 VDC (type test)
Distributed mode	
Prioritized startup	Yes
Dimensions	
Width	25 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	260 g
Miscellaneous	
Note:	Supplied incl. 40-pin push-in front connector

A

Dimensional drawing

The dimensional drawing of the module on the mounting rail, as well as a dimensional drawing with open front cover, are provided in this appendix. Always observe the specified dimensions for installation in cabinets, control rooms, etc.

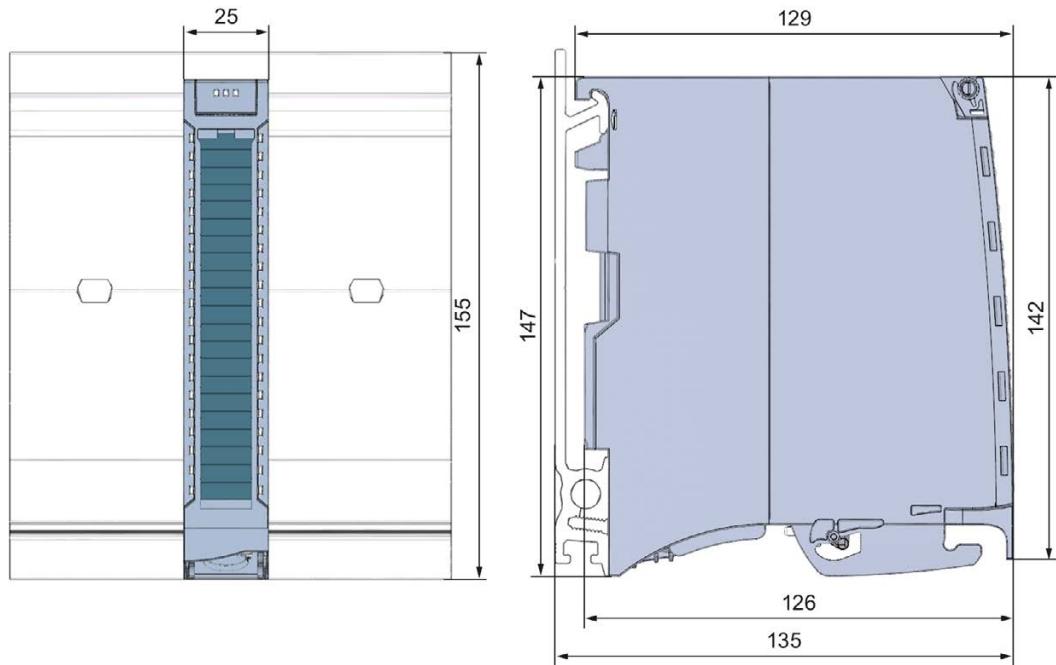


Figure A-1 Dimensional drawing of the DI 32x24VDC BA module

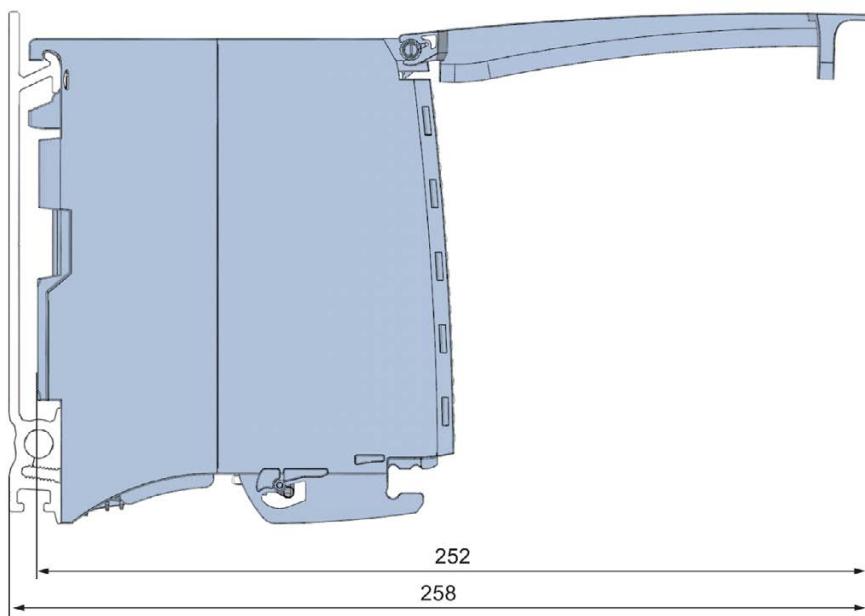


Figure A-2 Dimensional drawing of the DI 32x24VDC BA module, side view with open front cover

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B

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